Enbridge Line 6B MP 608
Marshall, MI Pipeline Release

Case No.: 15-1411-CE

No Further Action Report for Segment 10

Prepared for Michigan Department of Environment, Great Lakes, and Energy

Enbridge Energy, Limited Partnership

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FIGURES

TABLES

ATTACHMENTS

LIST OF ACRONYMS

ABC	Aquatic Background Concentration
bgs	below ground surface
BAP	Benzo(a)pyrene
Consent Judgment	Consent Judgment so agreed by the Michigan Department of Environmental Quality, Michigan Department of Attorney General, and Enbridge Energy Partners, L.P.; Enbridge Energy, Limited Partnership; Enbridge Pipelines (Lakehead) LLC; Enbridge Energy Management LLC; Enbridge Energy Company, Inc.; and Enbridge Employee Services, Inc. ordered, adjudged, and decreed pursuant to MCL 324.1701, MCL 324.3109, MCL 324.30112, MCL 324.30316, and MCL 324.20137, signed May 13, 2015
Criteria (Criterion)	Part 201 Residential Generic Cleanup Criteria (Criterion)
CSM	Conceptual Site Model
CSM-January 2016	*Conceptual Site Model – January 2016*, submitted to EGLE on January 22, 2016.
DCC	Part 201 Generic Residential Direct Contact Criteria
Drinking Water Assessment	*Kalamazoo River/Enbridge Spill: Evaluation of crude oil release to Talmadge Creek and Kalamazoo River on residential drinking water wells in nearby communities (Calhoun and Kalamazoo Counties, Michigan),* prepared on February 27, 2013
DWC	Part 201 Generic Residential Drinking Water Criteria
DWPC	Part 201 Generic Residential Drinking Water Protection Criteria
EGLE	Michigan Department of Environment, Great Lakes, and Energy
Enbridge	Enbridge Energy, Limited Partnership
ERL	Elevated Reporting Limit
Facility	Any area, place or property where a hazardous substance from the Enbridge Line 6B Marshall Release in excess of the concentrations that satisfy the cleanup criteria for unrestricted residential use has been released, deposited, disposed of, or otherwise comes to be located, as set forth at MCL 324.20101(1)(s). “Facility” does not include any area, place, or property where the conditions of MCL 324.20101(1)(s) (i)-(vi) have been satisfied.
FESL	Flammability and Explosivity Screening Level
ft	Feet
g/cm^3	grams per cubic centimeter
GC/MS	gas chromatography/mass spectrometry
GPS	Global Positioning System
Groundwater White Paper	*White Paper: Evaluation of Line 6B Crude Oil PNA and VOC Related Risk to Groundwater Quality*, submitted to EGLE on July 24, 2014.
GSIC	Part 201 Generic Residential Groundwater Surface Water Interface Criteria
GSIPC	Part 201 Generic Residential Groundwater Surface Water Interface Protection Criteria (for soils)
GVIAIC	Part 201 Generic Residential Groundwater Volatilization to Indoor Air Inhalation Criteria
HMW	high molecular weight

KRRI	Kalamazoo River Remedial Investigation
LDB	left descending bank
Line 6B	The pipeline owned by Enbridge Energy, Limited Partnership that runs just south of Marshall, Michigan
LMW	low molecular weight
MDEQ	Michigan Department of Environmental Quality
MDEQ Aesthetics Evaluation Technical Memorandum	*Technical Review Memorandum entitled Enbridge Line 6B MP 608, Marshall, MI, Pipeline Release – Aesthetics Evaluation Process*, dated October 17, 2016.
MDEQ Metals Technical Memorandum	*Technical Memorandum for: Site Specific background Metals Evaluation for Soil – Kalamazoo River (Reaches 5-9) Enbridge Oil Spill Site (Site ID # 14000017), Marshall, Michigan.* August 2016
Metals White Paper	*White Paper: Evaluation of Metals in Soil and Groundwater,* submitted to EGLE on June 4, 2014
MGP	Manufactured gas plant
mg/kg	milligrams per kilogram
MLE	Multiple lines of evidence
MP	Mile Post, used to identify the affected portions of Talmadge Creek and the Kalamazoo River. Mile Posts begin where the Line 6B release entered Talmadge Creek, MP 0.00 and extend downstream to the Morrow Reservoir (MP 39.85).
NAPL	Non-aqueous Phase Liquid
NAPL Body	A contiguous, measurable volume of Line 6B crude oil product in soil or on groundwater or in the soil pore volume, and not discontinuous, isolated, and *de minimis* observations of NAPL
NAPL White Paper	*White Paper: Evaluation of Line 6B Crude Oil NAPL Risk based on a Weight of Evidence Approach*, submitted to EGLE on June 12, 2015
NFA	No Further Action
O&M	Operations and Maintenance
OOR	Overbank Oil Recovery
OSCAR	Outstanding Sites Characterization and Reconciliation
Part 201	Part 201 of Michigan's Act 451 of 1994, as amended
PAH	Polynuclear Aromatic Hydrocarbons
PEC	Probable effect concentrations
PNAs	Polynuclear Aromatic Hydrocarbons
PSIC	Part 201 Generic Particulate Soil Inhalation Criteria
QAQC	Quality Assurance Quality Control
R5 ESLs	U.S. EPA Region 5 Ecological Screening Levels
RDB	right descending bank
Reach 41	A subset of the Spill Area that includes approximately 1.7 miles of the LDB and RDB of the Kalamazoo River starting at MP 32.19, and ending at MP 33.81.
Reach 42	A subset of the Spill Area that includes approximately 1.2 miles of the LDB and RDB of the Kalamazoo River starting at MP 33.74, and ending at MP 34.97.

Reach 43	A subset of the Spill Area that includes less than one mile of the LDB and RDB of the Kalamazoo River starting at MP 34.97, and ending at MP 35.78.
Reach 44	A subset of the Spill Area that includes approximately 1.2 miles of the LDB and RDB of the Kalamazoo River starting at MP 35.67, and ending at MP 36.53.
Reach 45	A subset of the Spill Area that includes approximately one mile of the LDB of the Kalamazoo River starting at MP 36.14, and ending at MP 37.26.
Reach 46	A subset of the Spill Area that includes less than one mile of the LDB of the Kalamazoo River starting at MP 37.04 and the RDB starting at MP 3.25, and ending at MP 34.84.
Reach 47	A subset of the Spill Area that includes less than one mile of the LDB and RDB of the Kalamazoo River starting at MP 37.04, and ending at MP 34.84.
Reach 48	A subset of the Spill Area that includes less than two and half miles of the LDB and RDB of the Kalamazoo River starting at MP 37.68, and ending at MP 40.10.
RI	Remedial Investigation
RRD	Remediation and Redevelopment Division
S^3TM	*EGLE Sampling Strategies and Statistics Training Materials (S^3TM) for Part 201 Cleanup Criteria,* issued August 2002.
SCAT	Shoreline Cleanup and Assessment Technique
Segment 10	Segment 10, as defined in the October 26, 2015 Updated Exhibit G of EGLE Consent Judgment, includes Reach 10, Reach 11, Reach 12, and Reach 13 of the Spill Area which extends over approximately 3.62 miles of the river shoreline from MP 5.86 to MP 9.48. More specifically, Segment 10 includes the overbank area along the Kalamazoo River extending from the former Ceresco Dam to the Historic Bridge Park.
SORT	Shoreline and Overbank Reassessment Technique
SOTF	Submerged Oil Task Force
Spill Area	Facility created by the July 2010 release of oil described in Paragraph 5.1 and also areas, places, or property that have been disturbed, destroyed, or otherwise altered as a result of the oil spill or response activities taken to address the oil spill, including but not limited to habitat, vegetation, surface waters, soils, sediments, groundwater, wetlands, floodplains, and overbank areas.
SPLP	Synthetic Precipitation Leaching Procedure
SSC	Site-Specific Criteria
SSL	Soil Screening Levels
SVIAIC	Part 201 Generic Residential Soil Volatilization to Indoor Air Inhalation Criteria
TAPS	Technical Assistance Program Support
Target metals	beryllium, molybdenum, nickel, and vanadium (target metals)
Tar patties	weathered surface features consisting of solidified, Line 6B crude oil residue
TBC	Terrestrial Background Concentration
TEC	Threshold Effect Concentrations
TPH	Total Petroleum Hydrocarbons
ug/kg	micrograms per kilogram
Urban PAH White Paper	*White Paper: Urban PAH Background Evaluation*, submitted to EGLE on August 28, 2015

U.S. EPA	United States Environmental Protection Agency
UV	Ultraviolet
VOCs	Volatile Organic Compounds
VSIC	Part 201 Generic Residential Soil Ambient Air Infinite Source Volatile Soil Inhalation Criteria

1.0 Introduction

This No Further Action (NFA) Report for Segment 10 of the Spill Area (Michigan Department of Environment, Great Lakes, and Energy (EGLE), formerly Michigan Department of Environmental Quality (MDEQ) Facility ID 13000397 - Enbridge Spill – Talmadge Ck – Kalamazoo Riv) summarizes how the response activities conducted by Enbridge Energy, Limited Partnership (Enbridge) have restored soil, sediment, groundwater, and surface water to conditions consistent with Part 201 of Michigan's Act 451 of 1994, as amended (Part 201) for unrestricted residential use. *Attachment A* includes a completed *Request for DEQ Review of No Further Action (NFA) Report* form, which provides specific details regarding the nature of this request.

For administrative purposes the Spill Area associated with the crude oil release from Enbridge's Line 6B pipeline (Line 6B) south of Marshall, Michigan was segregated into 48 separate Reaches, which were then combined into 11 Segments as defined in *Exhibit G* to the Consent Judgment so agreed by the MDEQ, Michigan Department of Attorney General, and Enbridge Energy Partners, L.P.; Enbridge Energy, Limited Partnership; Enbridge Pipelines (Lakehead) LLC; Enbridge Energy Management LLC; Enbridge Energy Company, Inc.; and Enbridge Employee Services, Inc. ordered, adjudged, and decreed pursuant to MCL 324.1701, MCL 324.3109, MCL 324.30112, MCL 324.30316, and MCL 324.20137, signed May 13, 2015 (Consent Judgment) (MDEQ, 2015a) and modified by the letter *MDEQ Consent Judgment Modifications - Request to Modify Exhibit E and Exhibit G*, submitted to EGLE on October 26, 2015 (Enbridge, 2015a). This NFA Report addresses the Segment 10 portion of the Spill Area, which consists of Reach 41 through Reach 48. *Section 1.3* provides a more detailed description of Segment 10.

This NFA Report summarizes the regulatory framework and background (*Section 1.0*), key project initiatives (*Section 2.0*), facility characterization with response activities and results (*Section 3.0)*, the scientific basis for concluding remedial actions are complete (*Section 4.0*), and a summary and conclusions (*Section 5.0*).

Throughout the course of the project the Conceptual Site Model (CSM), originally developed in November 2010, has presented a holistic, project-wide understanding of the effects of the Line 6B crude oil release on the environment. The CSM has been revised to document the evolution in the understanding of site conditions and to serve as a record of documents submitted for EGLE's administrative record. The *Conceptual Site Model – January 2016* was submitted to EGLE on

January 22, 2016 (CSM-January 2016) (Enbridge, 2016a). The CSM-January 2016 presents Enbridge's understanding of the system and relates this understanding to EGLE regulatory frame work.

This NFA Report, coupled with the Remedial Investigation (RI) Reports for Reach 41 through Reach 48, which comprise Segment 10, contains a detailed description of investigations, results, characterization, and evaluation for Segment 10. The RI Reports for Reach 41 through Reach 48 are included with this NFA Report as *Attachment B* through *Attachment I*, respectively. Collectively, these documents demonstrate that response activities have restored the overbank soil, sediment, groundwater, and surface water to such a degree that they meet Part 201 requirements for unrestricted residential use as related to impacts attributable to the Line 6B crude oil release. As a result, Segment 10 is suitable for NFA closure with unrestricted residential use.

Enbridge requests approval of this NFA Report for unrestricted residential use in accordance with Part 201, Section 20114d. In-channel data from the Kalamazoo River channel are not addressed in this NFA Report. The Kalamazoo River channel is evaluated in the *Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on April 25, 2014 (Enbridge, 2014a) and the *Addendum to the Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on October 30, 2015 (Enbridge, 2015b).

1.1 Regulatory Definitions and Framework

Requirements for NFA Reports are set forth under Section 324.20114d of Michigan's Natural Resources and Environmental Protection Act 451 of 1994, as amended, effective January 15, 2015. Section 324.20101 (hh) of the Act defines an NFA as:

> "…a report under section MCL324.20114d detailing the completion of remedial actions and including a postclosure plan and a postclosure agreement, if appropriate."

Section 324.20101 defines a facility as any area, place, parcel or parcels of property, or portion of a parcel of property where a hazardous substance in excess of the concentrations that satisfy the Part 201 cleanup criteria for unrestricted residential use (Criteria) has been released, deposited, disposed of, or otherwise comes to be located. However, for this project, EGLE, in the Consent Judgment, defines the Facility for the purposes of the Line 6B Marshall Release as "Any area, place or property where a hazardous substance from the Enbridge Line 6B Marshall Release in excess of the concentrations that satisfy the cleanup criteria for

unrestricted residential use has been released, deposited, disposed of, or otherwise comes to be located, as set forth at MCL 324.20101(1)(s). "Facility," as defined in the Consent Judgment, does not include any area, place, or property where the conditions of MCL 324.20101(1)(s) (i)-(vi) have been satisfied." (referred to herein as the "Facility").

The Consent Judgment further defines the "Spill Area" as the Facility created by "the Enbridge Line 6B Marshall Release and also private and public properties that have been disturbed, destroyed, dredged, excavated, or otherwise altered or damaged as a result of the release or Response Activities taken place to address the release, including but not limited to vegetation, surface waters, soils, sediments, groundwater, wetlands, floodplains, and overbank areas." (referred to herein as "Spill Area").

RI field work for Segment 10 was conducted in accordance with the *Administrative Consent Order and Partial Settlement Agreement entered In the Matter of Enbridge Energy Partners, L.P., and Enbridge Energy, Limited Partnership*, *proceedings under the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, MCL 324.101 et seq*.; issued November 1, 2010 (MDEQ, 2010). All assessment and response activities have been conducted pursuant to pertinent rules and regulations within Part 201 including cleanup criteria. All project activities were conducted under the supervision and in close cooperation with project-dedicated EGLE staff. Relevant Criteria as well as relevant ecological screening criteria are outlined in the following sections.

1.2 Line 6B Crude Oil Release Background

On July 26, 2010, Enbridge discovered a release of crude oil from the Line 6B pipeline that is located south of Marshall, Michigan. The Line 6B crude oil was released below grade via a break in the pipeline at Mile Post (MP) 608. The Line 6B crude oil subsequently emerged at the ground surface, flowed over land following the natural topography, and entered Talmadge Creek. The subset of the Spill Area that encompasses the pipeline breach and approximately 5 acres of land where the Line 6B crude oil release emerged onto the ground surface is defined as the Source Area. A volume of Line 6B crude oil entered Talmadge Creek at a point designated as MP 0.00 and was carried down the creek to the confluence with the Kalamazoo River, and subsequently was carried down the Kalamazoo River.

At the time of the Line 6B crude oil release, Talmadge Creek and Kalamazoo River discharges were higher than normal due to recent heavy rain, and in many areas, the creek and river had overflowed their banks. As water receded, the remnants of Line 6B crude oil floating on the water

surface, were carried along with the floodwater back into the main body of Talmadge Creek and the Kalamazoo River. However, Line 6B crude oil adhered to existing vegetation or became stranded in hydrologically isolated topographic depressions, cavities, burrows, and other traps within the flooded areas.

Following the Line 6B crude oil release, Enbridge performed emergency response activities that included a rapid mobilization of personnel and equipment to initiate immediate removal of the Line 6B crude oil from the environment under the direction and supervision of the United States Environmental Protection Agency (U.S. EPA) and EGLE. In 2011, the U.S. EPA estimated the response actions had recovered more than 90% of the Line 6B crude oil using boom, vacuum surface pumping, vegetation removal, and extensive excavation in the Source Area, along Talmadge Creek, and at select areas along the Kalamazoo River (U.S. EPA, 2011). Additional response actions were conducted from 2012 through 2014. NFA Reports have been submitted and approved for the following portions of the Spill Area:

- Source Area (Segment 1),
- Talmadge Creek (Segment 3 and Segment 4),
- the Kalamazoo River upstream of MP 5.86 (Segment 2 and Segment 5), and
- Frac Tank City, an auxiliary site that was not directly impacted by Line 6B (Segment 11).

In addition, the NFA Reports for Segment 6 (MP 5.86 – MP 9.48), Segment 7 (MP 9.48 – MP 13.88), Segment 8 (MP 13.88 – MP 21.25), and Segment 9 (MP 21.25 - MP 32.19) have been submitted and are undergoing EGLE review.

In Segment 10, activities were conducted on the Kalamazoo River and auxiliary areas as described in the sections below.

1.2.1 Kalamazoo River

Along the Kalamazoo River a series of efforts sequentially addressed assessment and response activities along the shoreline. The efforts were designed to focus on remaining impacts as the response efforts progressed. These efforts included the following:

- Shoreline Cleanup and Assessment Technique (SCAT),
- Submerged Oil Task Force (SOTF) programs,
- Operations and Maintenance (O&M),
- Outstanding Sites Characterization and Reconciliation (OSCAR),

- Overbank Oil Recovery (OOR),
- High Priority OSCAR,
- 2011 and 2012 Shoreline Overbank Reassessment Techniques (SORT),
- Kalamazoo River Remedial Investigation (KRRI), and
- Focused Excavations.

These activities are addressed in detail in the RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*, respectively).

1.2.2 Auxiliary Areas

Between late 2010 and 2014, auxiliary support areas (i.e., locations used to support response activities, including access roads, boat launches, boom maintenance, decontamination area, dredge pads, fueling activities, equipment staging, material storage, parking lots, waste staging, and water treatment) in Segment 10 were decommissioned. Following the decommissioning activities and excavations, subsequent sampling results indicated no exceedances of Criteria attributable to Line 6B crude oil.

1.2.3 Additional Reporting Evaluations

Enbridge met with EGLE in the fall of 2013 to discuss data gaps. Between 2014 and 2015, Enbridge completed a data gap evaluation along Talmadge Creek and the Kalamazoo River up to MP 12.67 on the left descending bank (LDB) and MP 12.79 on the right descending bank (RDB) (including Segment 1 through Segment 7). This work addressed, on a point-by-point basis, issues that Enbridge and EGLE had discussed during the meetings, including: elevated reporting limits (ERLs) in soil samples; remaining ultraviolet (UV) fluorescence observations (used as a soil screening tool) in sub-surface soil samples where there was no evaluation of potential human health risks; as well as Polynuclear Aromatic Hydrocarbons (PNA) and volatile organic compounds (VOCs) Criteria exceedances. The results of the point-by-point data gap evaluation expanded upon the existing robust dataset and from that, provided a holistic, CSM-type evaluation of the entire Spill Area generally. Upon review of this dataset, Enbridge and EGLE concurred that the existing data was sufficient to draw conclusions with regard to the remaining portions of the Spill Area downstream from Segment 7, and there was no need for future point-by-point evaluation within the remaining portions of the Spill Area downstream from Segment 7. As a result, there was no data gap evaluation completed in Segment 10.

From 2015 through 2019, Enbridge and EGLE addressed metals, Part 201 Generic Residential Groundwater Surface Water Interface Protection Criteria (for soils) (GSIPC), PNAs, and aesthetics in a series of meetings and joint efforts. These issues are addressed in *Section 2.3*, *Section 2.4*, *Section 2.5,* and *Section 2.7*, respectively.

1.3 Segment 10 Definition and Land Use

Segment 10 occupies 2,151.1 acres and extends from the Fort Custer State Recreational Area to approximately 1,000 feet (ft) past the Morrow Lake reservoir covering approximately 7.9 miles of the river shoreline from MP 32.19 – MP 40.10 as depicted on *Figure 1.* Segment 10 also includes 12 auxiliary areas.

This Segment 10 NFA Report was drawn from eight separate RI Reports for the reaches listed below:

- Reach 41 extending on the LDB from MP 32.19 – MP 33.81 and on the RDB from MP 32.63 – MP 33.70 (submitted August 24, 2017),
- Reach 42 extending on the LDB from MP 33.81 – MP 34.95 and on the RDB from MP 33.70 – MP 34.97 (submitted September 14, 2017),
- Reach 43 extending along the LDB and RDB from MP 34.97 – MP 35.78 (submitted October 5, 2017),
- Reach 44 extending along the LDB from MP 35.78 – MP 36.13 and on the RDB from MP 35.78 – 36.53 (submitted November 17, 2017),
- Reach 45 extending along the LDB from MP 36.13 – MP 37.30 and on the RDB from MP 36.53 – MP 37.25 (submitted December 14, 2017),
- Reach 46 extending on the LDB from MP 37.04 – MP 37.84 and the RDB from MP 37.25 – MP 37.84 (submitted January 11, 2018),
- Reach 47 extending on the RDB from MP 37.84 – MP 39.20 (submitted February 1, 2018), and
- Reach 48 extending on the LDB from MP 37.84 – MP 40.10 and on the RDB from MP 39.20 – MP 40.10 (submitted February 28, 2018).

The land use in Segment 10 is mixed and includes primarily rural residential, and agricultural with some open space, single family and medium dense residential, and lesser amounts of commercial, public/government/institution, conservation, recreation, limited land development, and light industrial. *Table 1* in the RI Reports for Reach 41 through Reach 48 (see *Attachment B*

through *Attachment I*, respectively) presents a tabulated list of each parcel, the address, Tax ID and zoning/land use for the parcels that comprise Segment 10. *Attachment J* contains a legal description for Segment 10.

1.4 Line 6B Crude Oil Characteristics

At the time of the Line 6B crude oil release, the oil being transported in the Line 6B pipeline was characterized as a heavy crude oil that contained a complex combination of hydrocarbons consisting primarily of paraffinic (straight and branched-chain alkanes), naphthenic (cycloalkanes or cycloparaffins), and aromatic hydrocarbons, including PNAs. The PNAs found in Line 6B crude oil are typically dominated by alkylated compounds, although non-alkylated PNAs, including the 16 Priority Pollutant PNAs, are reported, albeit at lower concentrations ranging from <1 milligram per kilogram (mg/kg) to approximately 170 mg/kg. Trace amounts of metals, predominantly beryllium, molybdenum, nickel, and vanadium (target metals) were also present within the crude oil that was released from Line 6B. The density of Line 6B crude oil was determined from six samples and ranged from 0.92 grams per cubic centimeter (g/cm^3) to 0.93 g/cm^3, slightly below that of water (1.00 g/cm^3). The RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*, respectively) contain a more detailed description of Line 6B crude oil and its characteristics.

1.5 Media Addressed in NFA

This NFA Report addresses all media which may have been affected by the Line 6B crude oil release and response activities in the Segment 10 Spill Area and for which there are applicable Criteria. Enbridge worked closely and extensively with both EGLE and U.S. EPA in evaluating and characterizing impacts to the environmental media which includes the following:

- Soil (both saturated and unsaturated),
- Overbank sediment,
- Surface water (within overbank areas), and
- Groundwater.

The saturated and unsaturated soil differentiation is significant in that Part 201 Criteria are generally not applicable to saturated soils. For the purposes of this project, Enbridge and EGLE agreed that saturated soil would be compared to Direct Contact Criteria (DCC), but not to Generic Residential Groundwater Surface Water Interface Protection Criteria (GSIPC) or Generic Residential Drinking Water Protection Criteria (DWPC).

Surface water and sediments in the channel of the Kalamazoo River are addressed in the *Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on April 25, 2014 (Enbridge, 2014a) and the *Addendum to the Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on October 30, 2015 (Enbridge, 2015b).

1.6 Potential Contamination Addressed in NFA

Part 201, Section 20114d allows NFA Reports to address all or portions of contamination that exist at a facility. This NFA Report addresses all contamination in Segment 10 that resulted from the Line 6B crude oil release.

1.7 Timeline

Following the Line 6B crude oil release, Enbridge performed emergency response activities under the direction and supervision of the U.S. EPA and EGLE, to remove Line 6B crude oil from the Spill Area. The RI reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*) include detailed timelines documenting activities within each of the Reaches.

1.8 Cleanup Criteria, Screening Levels, and Aesthetic Evaluation

In accordance with the Consent Judgment, all assessment and remediation activities have been conducted pursuant to pertinent rules and regulations included in Part 201 and according to agency approved work plans and documents. This report, and the accompanying RI Reports for Reach 41 through Reach 48 (*Attachment B* through *Attachment I*), evaluates both the human health and ecological risks related to the Line 6B crude oil release as detailed in this section. As stated previously in *Section 1.5*, EGLE agreed that surface water and sediment data associated with the in-channel portions of the Kalamazoo River will not be addressed in this report; however, sediment data from the overbank areas will be evaluated.

1.8.1 Human Health Criteria

The human health Criteria used for comparison to evaluate analytical results for soil, overbank sediment, and groundwater (collectively referred to as environmental media), and potable water are the following:

- Part 201 Generic Residential Direct Contact Criteria (DCC),
- Part 201 Generic Residential Soil Drinking Water Protection Criteria (DWPC),
- Part 201 Generic Residential Soil Groundwater Surface Water Interface Protection Criteria (for soils) (GSIPC),
- Part 201 Generic Residential Soil Volatilization to Indoor Air Inhalation Criteria (SVIAIC),

- Part 201 Generic Residential Soil Ambient Air Infinite Source Volatile Soil Inhalation Criteria (VSIC),
- Part 201 Generic Particulate Soil Inhalation Criteria (PSIC),
- Soil Saturation Screening Level,
- Part 201 Generic Residential Drinking Water Criteria (DWC),
- Part 201 Generic Residential Groundwater Surface Water Interface Criteria (for groundwater) (GSIC),
- Part 201 Generic Residential Groundwater Volatilization to Indoor Air Inhalation Criteria (GVIAIC), and
- Flammability and Explosivity Screening Level (FESL).

More specifically, chemical concentrations in each medium were compared to the Criteria as listed below:

- Unsaturated soil results were compared to the DCC, DWPC, GSIPC, and SVIAIC,
- Saturated soil and overbank sediment results were compared to the DCC for screening purposes only (as requested by EGLE),
- Surface water results were compared to GSIC (which are the same as Michigan's water quality values) as well as EGLE Rule 57 Water Quality Standards, and
- Groundwater results were compared to DWC, GSIC, and GVIAIC.

Analytical data were compared to the most conservative Criterion, therefore Criteria that are less conservative (VSIC, PSIC, and FESL) are not explicitly evaluated in the data tables, but are considered in the exposure evaluation in *Section 4.0*.

Algorithms used to develop Criteria do not account for saturated soil conditions; therefore, (as agreed upon with EGLE) analytical results for sediment and saturated soil samples were only compared to DCC for screening purposes.

The specific Criteria are presented in Michigan Administrative Code, Rule 299.44 (groundwater) and Rule 299.46 (soil). Chemical-specific aesthetic Criteria are incorporated into the DWC for chemicals that have taste or odor thresholds that are less than Criteria based on human health. The evaluation of results against Criteria are presented in *Section 3.0* and the basis for concluding that remedial actions are complete are presented in *Section 4.0*.

One problematic issue for the project is constituents that occur both in Line 6B crude oil and in background Kalamazoo River flood plain soil and sediment. Similar constituents that occur in Line 6B crude oil have historically been released into the Kalamazoo River from human habitation and urban development over the past 100 or more years. Part 201 addresses the issue of background concentrations of these constituents, such as PNAs and metals.
Section 324.20101(e) defines background concentrations:

> *Background concentration means the concentration or level of a hazardous substance that exists in the environment at or regionally proximate to a facility that is not attributable to any release at or regionally proximate to the facility.*

Through a series of meetings and joint efforts, Enbridge and EGLE have evaluated the presence of urban background PNAs for the entire Spill Area and have developed a framework to address the PNA Criteria exceedances. The framework, referred to as the Forensics Process, utilizes multiple lines of evidence (MLE) to evaluate soil analytical data through a five step process which sequentially focuses evaluation of PNA results exceeding Criteria to those samples that reflect potential impact from Line 6B crude oil. The process is discussed in detail in *Section 2.5* and the results are presented in *Section 3.5*. The forensics data are included in *Attachment K*.

Enbridge has also evaluated the presence of the four target metals across Segment 10 and this evaluation has shown that detected concentrations of these metals are related to naturally occurring background conditions. *Section 2.3* summarizes this effort which includes the *White Paper: Evaluation of Metals in Soil and Groundwater*, submitted to EGLE on June 4, 2014 (Metals White Paper) (Enbridge, 2014b) and included in *Attachment L*. In addition, EGLE developed a background - foreground evaluation to evaluate target metals concentrations in Reach 5 through Reach 9. The *Technical Memorandum for: Site Specific background Metals Evaluation for Soil – Kalamazoo River (Reaches 5-9) Enbridge Oil Spill Site (Site ID # 14000017), Marshall, Michigan* (MDEQ Metals Technical Memorandum) (MDEQ, 2016a) summarizes the findings of the evaluation, which showed target metals concentrations in Reach 5 through Reach 9 (Segment 2 and Segment 5) that exceeded Criteria reflect background conditions. It was the intent of the MDEQ Metals Technical Memorandum, covering Segment 2 and Segment 5, to be a guide for Enbridge to complete similar evaluations for subsequent NFA Reports including Segment 10. This evaluation is included as *Attachment M* and is described in more detail in *Section 2.3* and *Section 3.3*.

1.8.2 Ecological Screening Evaluation

Terrestrial ecological impacts were evaluated using the U.S. EPA Region 5 ecological screening levels (R5 ESLs) (U.S. EPA, 2003) and the U.S. EPA soil screening levels (SSLs) (U.S. EPA, 2014a) in the RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*). However, the soil evaluation for all results in Segment 10 has been expanded to include low-effect SSLs developed by Enbridge as well as evaluation of MLE. This analysis is detailed in *Section 3.6.1*.

In addition, overbank surface water and sediment samples were evaluated using EGLE Rule 57 Water Quality Standards and R5 ESLs and Probable Effect Concentrations (PECs) from the U.S. EPA and other sources. This analysis is detailed in *Section 3.6.2*.

Section 2.6 presents further information on screening levels used for the ecological evaluation.

1.8.3 Aesthetics Evaluation

Aesthetic observations are subjective evaluations of residual effects that are observable (generally through taste, sight, or smell) and that may be objectionable to an individual who encounters them. Enbridge, working with EGLE, has developed and performed an aesthetics evaluation for remaining Line 6B crude oil observations throughout the entire Spill Area, including the Segment 10 Spill Area. The RI Reports for Reach 41 through Reach 48 (*Attachment B* through *Attachment I*) contain specific and detailed evaluation of remaining aesthetic observations at the time the RI Reports were published. *Section 3.7* of this NFA Report summarizes how the remaining aesthetic observations have been addressed in Segment 10.

1.9 Analytical Program

The laboratory analytical program for this project has evolved over time; however, the predominant analytical groups used for evaluating impact to the environment were VOCs, PNAs, and target metals. A summary of the analytical parameters used for this project, the quality assurance quality control (QAQC) evaluation of the laboratory results, ERLs, and EGLE split sample program is presented in the RI Reports for Reach 41 through Reach 48 (*Attachment B* through *Attachment I*).

All laboratory data included in the RI Reports for Reach 41 through Reach 48 is included in *Attachment N* of this NFA Report. The RI Reports included in *Attachment B* through *Attachment I* do not include laboratory data packages. Compiling the laboratory data in one attachment avoids duplication and reduces the overall file size of this NFA Report.

2.0 Key Project Initiatives

The Segment 10 Spill Area has undergone extensive emergency response activities, excavations, characterization, and restoration. Comprehensive data have been collected to demonstrate that residual Line 6B crude oil no longer presents a risk to human health or the environment in the Segment 10 Spill Area.

During the characterization efforts, EGLE raised concerns regarding several potential issues, which led Enbridge to initiate significant evaluations and additional characterization. These key initiatives include:

- Non-aqueous Phase Liquid (NAPL),
- Line 6B crude oil/groundwater solubility,
- Metals,
- Urban background contaminants,
- Ecological screening, and
- Aesthetics.

This section addresses each of these initiatives and explains the manner in which data and analysis establish that the concerns raised by EGLE have been addressed, and more importantly, that the Segment 10 Spill Area has been restored to conditions consistent with Part 201 unrestricted residential use.

2.1 Non-aqueous Phase Liquid

NAPL is defined as a liquid, such as gasoline, diesel, or other petroleum-based fuel, waste oil, or crude oil that contains one or more organic compounds that are relatively insoluble in water (ASTM, 2007; ITRC, 2009; MDEQ, 2014). In the environment, NAPL exists as a separate phase that is immiscible with water. Line 6B crude oil meets this definition of NAPL and, immediately following the Line 6B crude oil release, NAPL was present in Segment 10. However, the extensive response and remedial activities, including testing and characterization, along with a NAPL mobility evaluation, found no secondary source area, either as mobile NAPL or NAPL body in Segment 10. Results of this effort were reported in the *White Paper: Evaluation of Line 6B Crude Oil NAPL Risk based on a Weight of Evidence Approach,* submitted to EGLE on July 30, 2015 (NAPL White Paper) (Enbridge, 2015c), included as *Attachment O*. Any residual NAPL that may remain exists as discontinuous and isolated visible oil and/or sheen in the

subsurface which are immobile and *de minimis*. However, it should be noted that these residuals do not contribute to exceedances of Criteria. NAPL in the Spill Area and specifically in Segment 10 is discussed in detail and addressed in the RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*, respectively).

2.2 Groundwater Solubility

The *White Paper: Evaluation of Line 6B Crude Oil PNA and VOC Related Risk to Groundwater Quality*, submitted to EGLE on July 24, 2014 (Groundwater White Paper) (Enbridge, 2014c) (included in electronic format in *Attachment P*) evaluated the risk posed to groundwater quality by remaining hydrocarbons, specifically PNAs and VOCs. Groundwater solubility in the Spill Area and specifically Segment 10 is discussed in detail and addressed in the RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I,* respectively). In summary, the Groundwater White Paper and RI Reports demonstrate that Line 6B crude oil is not sufficiently soluble in groundwater to be a significant source of target metals, PNAs, or VOCs.

2.3 Metals

To address elevated metals reported in both soil and groundwater samples, Enbridge performed a comprehensive evaluation of naturally occurring background concentrations of metals, both in soil and groundwater. The results of this effort were published in the Metals White Paper. *Attachment L* contains a copy of this report. The primary focus of the evaluation was the four target metals, which were identified at low concentrations in the analysis of crude oil samples from the Line 6B pipeline by EGLE in 2010. Following publication of the Metals White Paper, EGLE developed an evaluation on target metals that is detailed in the MDEQ Metals Technical Memorandum. It was the intent of this evaluation to be a guide used by Enbridge to complete similar evaluations along the remaining NFA segments of the river.

The remainder of this section provides a more detailed evaluation of metals for both soil and groundwater.

2.3.1 Soil

EGLE opined that the conclusions from the Metals White Paper regarding soil samples were not fully supported by the information provided in the paper (MDEQ, 2015b). Consequently, EGLE completed a study of molybdenum and vanadium, two of the four target metals, with soil sample exceedances in Reach 5 through Reach 9 (including Segment 2 and Segment 5) using a background - foreground approach.

This study was detailed in the MDEQ Metals Technical Memorandum. The approach started with identification of a background data set determined not to have been affected by Line 6B crude oil. The following samples were screened out from the background dataset:

- Samples with VOC or PNA detections (including the entire soil core),
- Samples noted as "impacted" having visual, UV, odor, or other field-screening indications of oil or anthropogenic impact,
- Saturated samples (collected below the static water table), and
- Excavated samples that are no longer representative of site conditions.

A statistical evaluation of this data using the U.S. EPA ProUCL version 5.0.00 program generated background concentrations for each metal and segregated them by soil type. These results were then compared to results from foreground samples, which were collected from locations determined to have been affected by Line 6B crude oil. While there were some challenges to the evaluation, owing to the limited size of data sets and/or non-detect results, the results generally showed there was little, if any, difference in the foreground and background data sets.

EGLE then had their internal Technical Assistance Program Support (TAPS) team conduct a review of the study. The TAPS review, which included sampling information, procedures and statistical evaluation found that "*the molybdenum and vanadium present in the soil are attributable to background within the area of study*" (MDEQ, 2017a).

In the *Revised MDEQ Draft Review Comments for Remedial Investigation Reports Reaches 6 through 13,* submitted to Enbridge on February 12, 2016 (MDEQ, 2016b), EGLE recognized the evaluations in the Metals White Paper, but restated their position that the conclusions were not supported by the information presented in the Metals White Paper. EGLE went on to request that further evaluation, similar to the background metals evaluations for Segment 2 and Segment 5, be conducted. Enbridge has completed this evaluation for Segment 10 (Reach 41 through Reach 48) using the Background – Foreground Evaluation approach developed by EGLE. A more detailed description of the approach and the results is presented in *Section 3.3*.

Based on this analysis and conclusions of both the Metals White Paper and by application of the EGLE Background – Foreground Evaluation to data from Reach 41 through 48, no additional evaluation of metals in soil is needed for this NFA Report.

2.3.2 Groundwater

EGLE opined that the conclusions from the Metals White Paper regarding groundwater results were not fully supported by the information provided in the paper (MDEQ, 2015c).

In the *Draft Review Comments for Remedial investigation Report Reaches 41 through 48*, submitted to Enbridge on November 1, 2018 (MDEQ, 2018), EGLE noted that one sample reported an exceedance of vanadium. EGLE concluded that due to the lack of additional vanadium exceedances in groundwater it is likely that the vanadium exceedance was a result of background conditions. Therefore, this location is not a regulatory concern. Based on this analysis, no additional evaluation of metals in groundwater is needed for this NFA Report.

2.4 GSIPC

To address elevated GSIPC exceedances observed along the Kalamazoo River, Enbridge completed a comprehensive evaluation of the soil's groundwater-surface water interface pathway for Reach 16 through Reach 22 (part of Segment 7). This approach evaluated these exceedances using MLE to show that the pathway is incomplete. More specifically, in Reach 16 to Reach 22, Enbridge conducted a point by point evaluation of each GSIPC exceedance using groundwater, Synthetic Precipitation Leaching Procedure (SPLP), and adjacent soil results to show the groundwater surface water interface pathway, and by association the GSIPC pathway, was incomplete. EGLE concurred with this finding, which was detailed in a letter dated March 30, 2017 (MDEQ, 2017b) (*Attachment Q*).

Similar methods used in the Reach 16 through Reach 22 evaluation were then applied river wide. The river wide evaluation first reviewed the extensive groundwater and SPLP analytical data, which showed GSIC exceedances are very infrequent. The river wide evaluation then turned to GSIPC exceedances and used SPLP, co-located groundwater, and groundwater results within a 25-foot (ft) radius of a GSIPC exceedance to show that the pathway is typically incomplete. The only location where a GSIPC exceedance may reflect potential for leaching from soil to groundwater is in the soil samples collected at a former manufactured gas plant (MGP) site in Battle Creek, Michigan, discussed further in *Section 2.5*. The results of the river wide evaluation are summarized in *Section 3.4* of this NFA Report and presented in detail in the *GSIPC Evaluation and Write-Up*, submitted to EGLE on May 2, 2019 (Enbridge, 2019) included in *Attachment Q*.

2.5 Forensics Process – Urban Background Contaminants

The Kalamazoo River basin has a long history of industrial development that predates the Line 6B crude oil release by well over 100 years. As a result, many compounds have impacted the basin, most notably PNAs, but also VOCs, metals, and polychlorinated biphenyls. The industry with perhaps the most well-known impact to this, and many other similar urban river systems, is manufactured gas. Pyrogenic PNAs are byproducts of combustion from legacy sites such as MGP, wood treatment facilities, smelters, or ongoing atmospheric deposition from combustion sources. They are formed by high temperature processes such as combustion of petroleum, wood, coal, and the pyrolysis of petroleum or coal to produce creosote, coal tar, and other products associated with manufactured gas production.

PNAs are represented by the abbreviations 'PAH' and 'PNA' interchangeably in this document. 'PAH' is used in the *White Paper: Urban PAH Background Evaluation*, submitted to EGLE on August 28, 2015 (Urban PAH White Paper), (Enbridge, 2015d), consistent with U.S. EPA and most environmental industry practice. The abbreviation 'PNA' is used in most Enbridge documents to be consistent with the convention established in EGLE's Remediation and Redevelopment Division (RRD) *Operational Memorandum No.2* (MDEQ, 2004) and other EGLE guidance.

PNAs are common contaminants of urban soils and urban river sediments (ATSDR, 1995; IEPA, 2005; EPRI, 2008; Stout et al, 2004). Studies have shown that part per million levels of PNAs are ubiquitous, especially in urban areas (Bradley et al., 1994). Along the Kalamazoo River, this is reflected in the 34 background soil samples collected upstream of the Talmadge Creek confluence in an area not impacted by the Line 6B crude oil release. The upstream background locations are shown on *Figure 2* and analytical data are presented in *Table 1*. These samples reflect the extensive PNA impacts in the Kalamazoo River flood plain soils. The presence of PNAs in the Kalamazoo flood plain is contrasted with the absence of PNAs in soil samples collected along Talmadge Creek and in the Source Area.

PNAs can be further broken down into two general categories; pyrogenic and petrogenic. Pyrogenic PNAs (in particular the 4 to 6 ring PNAs such as benzo(a)pyrene (BAP), fluoranthene, and pyrene) are formed by the incomplete burning of fuels, which include vehicle exhaust, coal burning, forest fires, tar-based asphalt pavement sealer, and tar or creosote produced by manufactured gas production. Pyrogenic PNAs are generally "parent" PNA's and are composed of ring systems without alkyl groups attached. The U.S. EPA priority pollutant PNAs are all

parent PNAs. Weathered pyrogenic PNAs are dominated by the 4-6 ring or high molecular weight group. Petrogenic PNAs (in particular the 2 to 3 ring or low molecular weight PNAs) are associated with crude oil and refined petroleum products and are also sources of PNAs in urban environments. Petrogenic PNAs dominated by alkylated rings, and the parent PNAs are minor components of petroleum. Analytical data indicate that the priority pollutant PNAs constituted less than 0.03% of the Line 6B crude oil.

In 2011, the U.S. EPA estimated that the initial response actions had recovered more than 90% of the Line 6B crude oil using boom, vacuum surface pumping, vegetation removal, and extensive excavation in the Source Area, along Talmadge Creek, and at select areas along the Kalamazoo River (U.S. EPA, 2011). After the initial response activities Enbridge began to identify and investigate the nature and presence of any remaining impact which may have been caused by the Line 6B crude oil release. During this work, it became clear that forensic chemistry would play an important role in accurately determining the relationship between the released Line 6B crude oil and urban background contaminants.

Throughout 2012 and 2013, Enbridge worked closely with the U.S. EPA and EGLE to evaluate forensic methods to estimate the amount of Line 6B crude oil remaining in the sediments. This initial approach used chemometric and forensic techniques to identify PNA profiles associated with Line 6B crude oil and other sources. Due to lack of response to this evaluation, and at the suggestion of EGLE, specific Human Health Site-Specific Criteria (SSC) were developed by Enbridge. The methods used and results of applying EGLE's suggested approach to the soil in overbank areas along the Kalamazoo River are presented in the *White Paper: Development of Human Health Evaluation Criteria for Overbank Areas,* submitted to EGLE on January 16, 2014 (Enbridge, 2014d) and included in *Attachment R.* Upon disapproval of the SSC and comments provided by EGLE and much discussion, the Urban PAH White Paper (*Attachment S*) was developed to build upon the initial chemometric and forensics work. The PNA forensics approach was further refined and modified through numerous revisions, meetings, and multiple discussions between EGLE, Enbridge, and leading technical experts in the field. Collectively, these efforts form the foundation for addressing elevated urban background PNAs detected on the Kalamazoo River (specifically Segment 10). This developed approach is referred to as the Forensics Process in the remainder of the report.

The Forensics Process as agreed upon between EGLE and Enbridge consists of five steps which sequentially focuses evaluation of PNA (specifically BAP) results exceeding Criteria to those

samples that reflect potential impact from Line 6B crude oil. BAP is the main focus of this evaluation due to the presence of DCC exceedances across the Spill Area. A more detailed description of each step is presented in detail in the following sections. *Figure 3* depicts a summary of the process through a flow diagram.

2.5.1 Step 1 – Comparison of BAP to DCC

Step 1 of the process compares a sample's BAP concentration to the DCC. If the concentration is below the DCC no further evaluation is necessary. If the BAP concentration exceeds the DCC the sample moves on to Step 2.

2.5.2 Step 2 – Geo-spatial Evaluation

The sample location is evaluated. If the sample with a DCC exceedance is located in an area where:

- Other nearby samples show no DCC exceedances, making the sample with a DCC exceedance isolated, or
- Other nearby samples with similar BAP DCC exceedances have been shown to not be attributable to Line 6B crude oil.

Then no further evaluation is necessary. If there are other samples in the area with BAP DCC exceedances, then the sample is considered to be within a cluster and therefore moves on to Step 3.

2.5.3 Step 3 – TPH Evaluation

If the original sample was analyzed for total petroleum hydrocarbons (TPH), then that TPH value is used within the calculation in Step 4. If the sample was not analyzed for TPH, the TPH concentration is estimated by reprocessing the gas chromatography/mass spectrometry (GC/MS) raw data to produce an approximate TPH value as agreed upon by the Enbridge and EGLE teams. EGLE-approved estimating TPH content standard operating procedure developed by Ann Arbor Technical Services, Inc. is included in the forensics data package (*Attachment K).*

2.5.4 Step 4 – Calculation of a BAP Maximum Percent Contribution From Line 6B crude oil Estimation

Using either the TPH value originally analyzed for the sample or the TPH value estimate established from the reprocessing of the GC/MS raw data, the maximum percent contribution of

BAP from Line 6B crude oil that could be present in the sample is calculated using the following formula:

$$BaP_{max}/BaP_{soil}\,(\%) = 100*(\text{average BaPTPH}*TPH/10^6)/BaP_{soil}$$

(Where average BaPTPH = 21.95 mg BaP/kg TPH, derived from the mean of 3 source oils and 2 tar patties)

This formula conservatively assumes that all of the petrogenic signature within a sample is from Line 6B crude oil and uses the average BAP concentration found in Line 6B crude oil and tar patty samples collected in the Spill Area to calculate the maximum percentage of a sample's BAP concentration that could be attributable to Line 6B crude oil.

If the calculated maximum percent of BAP attributable to Line 6B crude oil is less than or equal to 3% no further evaluation is required; however, if the calculated percent is greater than 3% the sample continues to Step 5 for further evaluation. It should be noted that, as stated previously, this calculation is inherently conservative as it assumes all of the petrogenic signature within the Kalamazoo River floodplain is the result of Line 6B crude oil. Furthermore, Enbridge agreed to lower the action level from 5% (as originally established) to 3%, committing to a thorough further evaluation of any cluster of samples that have a conservatively calculated Line 6B BAP maximum concentration above 3% of the total BAP concentration.

2.5.5 Step 5 – Further Evaluation

Step 5 entails further evaluation of the sample and the sample location. This consists of the following:

- Evaluation of the ecological sensitivity of the sample location. This step is to consider if additional actions at ecologically sensitive locations may result in more ecological impact to the location than would result if the location is not disturbed.
- Nature and extent of non-Line 6B crude oil exceedances in the vicinity of the sample. If there are numerous other samples within the area with Criteria exceedances that are not attributable to Line 6B crude oil, then additional action to address a sample location may not be warranted.
- Assessment of plausible exposure scenarios. This step is to determine if exposure scenarios inherent in the Part 201 DCC are plausible, or if the location is such (i.e.,

heavily wooded or wetland area, small remote island, etc) that exposure is not plausible at the exposure scenario frequency or duration established as part of the DCC.

- Examination of GC/MS chromatograms. The use of chromatogram comparison to known Line 6B crude oil and urban background chromatograms, and the use of statistical cross-plot comparison of priority pollutant PNAs with Line 6B crude oil and background reference samples will be used as a part of the MLE evaluation.
- Potential resampling for additional forensic analyses. If, based upon the MLE evaluated above, it remains unclear as to the course of action for a given sample location or cluster of locations, appropriate representative resampling of the location (or agreed upon subset of a cluster) will be completed and the sample(s) analyzed for full forensic analysis. The resampled forensic data will be run through the above process and will include use of the mixing model.
- Application of the mixing model. For samples (or resamples) that have been run for the full forensic analysis and that require further evaluation a mixing model has been developed to approximate the BAP concentration attributable to Line 6B crude oil. A detailed description of the mixing model is included in *Attachment K.*

2.6 Ecological Screening Evaluation

In the RI Reports, the R5 ESLs and the SSLs were used to screen saturated and unsaturated soils for potential terrestrial ecological risks. R5 ESLs were used for VOCs and SSLs were used for PNAs. However, the soil evaluation has been expanded to include terrestrial background concentrations. In addition, aquatic ecological impacts are evaluated using Michigan's water quality values for surface water and R5 ESLs and PECs from the U.S. EPA and other sources for overbank sediments. A description of the revised evaluation is outlined below. *Section 3.6* of this NFA Report presents a detailed ecological evaluation of the data in Segment 10.

2.6.1 Terrestrial Ecological Screening Levels and Soil Screening Levels

The U.S. EPA developed R5 ESLs for many chemicals, including VOCs and PNAs. The U.S. EPA Office of Solid Waste and Emergency Response developed SSLs (U.S. EPA, 2007) for PNAs, but not for VOCs. The U.S. EPA prefers use of SSLs over R5 ESLs if both are available for a chemical because the SSLs were developed more recently using standard documented procedures. The R5 ESLs and SSLs were developed to determine if there is no risk or need for

further evaluation of chemical concentrations in soil, but they are not intended to be used as cleanup criteria (U.S. EPA, 2005).

The SSLs are available for two groups of PNAs: low molecular weight (LMW) PNAs with fewer than four aromatic rings and high molecular weight (HMW) PNAs with four or more aromatic rings. The SSL for LMW PNAs is based on toxicity to soil invertebrates, primarily springtails and earthworms and on endpoints that are deemed "sufficiently protective of ecological resources" (U.S. EPA, 2005). The LMW SSL for soil invertebrates is less than the LMW SSL for mammals, so both groups of organisms are considered.

The U.S. EPA SSL for HMW PNAs is based on toxicity to small mammals (U.S. EPA, 2007). More specifically, mice were used for the toxicity tests and shrews were used for models to develop the HMW SSL. The mammalian SSLs are based on no-effect levels, which are the concentrations that had no observed effect on the test organisms. The HMW SSL for mammals is less than the HMW SSL for soil invertebrates, so both groups of organisms are considered.

The shrews used to develop the SSLs have a home range of approximately 0.6 to 1.4 acres (Lee, 2001 and Berger, 2004, respectively) and generally do not burrow deep into the soil.

2.6.2 Terrestrial Low-effect Soil Screening Levels

Enbridge developed low-effect SSLs for invertebrates and mammals based on low-effect endpoints (*Attachment T*) instead of the "sufficiently protective of ecological resources" and no-effect endpoints used for the SSLs. The potential risks to receptors (invertebrates and mammals) that may be exposed to PNAs in soil can be bracketed using the SSLs and low-effect SSLs. The SSLs and the low-effect SSLs are presented in the table below.

	Receptor			
	Soil Invertebrates		**Mammals**	
	U.S. EPA SSL (mg/kg)	**Low-Effect SSL (mg/kg)**	**U.S. EPA SSL (mg/kg)**	**Low-Effect SSL (mg/kg)**
Low Molecular Weight PNA	29	65.6	100	171
High Molecular Weight PNA	18	20.7	1.1	5.6

Section 3.6.1.1 applies the low-effect SSLs on a point by point basis before any additional evaluation or consideration of other lines of evidence. Saturated and unsaturated soils are included in the terrestrial ecological evaluation. Additional evaluations with other lines of evidence are presented to address samples with concentrations that exceed the low-effect SSLs derived.

2.6.3 Terrestrial Background Concentrations

The background data, collected upstream of Talmadge Creek, are compared to the U.S. EPA's soil ESLs and SSLs in *Table 2.* Background sample locations are shown on *Figure 2*.

The SSLs (see *Section 1.8.2*) used to evaluate terrestrial exposures are based on groups of PNAs. The SSLs are available for LMW and HMW PNAs.

Terrestrial Background Concentrations (TBCs) were developed for LMW PNAs and HMW PNAs and are used as another line of evidence to evaluate PNA concentrations in soil. These TBCs were developed using the U.S. EPA's ProUCL statistical program (U.S. EPA, 2013). The LMW, HMW, and total PNA concentrations are sums of the concentrations of individual PNAs, which are from different populations with different statistical distributions. Parametric statistics require that the data represent one statistical population and so cannot be used for developing statistically-based TBCs. The nonparametric Kaplan-Meier test was used to calculate the mean and standard deviation of the summed LMW and HMW data. The TBC was calculated as the mean plus three standard deviations, which is consistent with the MDEQ Sampling Strategies and Statistics Training Materials (S^3TM) for Part 201 Cleanup Criteria, issued August 2002 (MDEQ, 2002). ProUCL recommends using the detection limits for concentrations reported as less than the detection limit.

The TBCs calculated using detection limits for non-detected concentrations are:

- LMW PNAs – 17,219 micrograms per kilogram (ug/kg), and
- HMW PNAs – 136,730 ug/kg.

Using the detection limits is appropriate and necessary for comparing LMW and HMW PNA concentrations to the TBCs, but also results in LMW and HMW concentrations that exceed the SSLs even if all concentrations are below the detection limits. Therefore, the LMW and HMW concentrations based on full detection limits can be compared to the TBCs that were also

calculated using the full detection limit. Separate LMW and HMW concentrations, calculated for each sample using zero for non-detected concentrations, were compared to the SSLs.

2.6.4 Aquatic Ecological Screening Levels

Sediment screening levels recommended by EGLE RRD were used to evaluate the potential ecological impact of the Line 6B crude oil release on overbank sediments. These screening levels are not cleanup criteria, but provide an initial screening to determine if further evaluation is needed.

Initial screening of chemical concentrations in overbank sediment, as suggested in *Appendix A* and *Appendix B* of *MDEQ RRD Operational Memorandum No. 4 – Attachment 3* (MDEQ, 2006) is based on exceedances of R5 ESLs for sediments (U.S. EPA, 2003).

The sediment R5 ESLs incorporate threshold effect concentrations (TECs) developed from the *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald et al., 2000). *Appendix A* of the *RRD Operational Memorandum No. 4* presents the TECs for PNAs (MacDonald et al., 2000), as summarized by the U.S. EPA (U.S. EPA, 2003). These TECs are geometric means of screening values derived from various sources of data on sediment toxicity to freshwater organisms. Adverse effects to the benthic community are not likely if concentrations are less than the TECs.

PECs are concentrations above which adverse impacts are expected, and are also based on geometric means of other screening values. The PECs are from *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald et al., 2000) and the Wisconsin Department of Natural Resources (WDNR, 2003). The approach and sediment screening levels used to address overbank sediment are the same as the approach and sediment screening levels used for Kalamazoo River sediments in the *Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on April 25, 2014 (Enbridge, 2014a) and the *Addendum to the Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on October 30, 2015 (Enbridge, 2015b).

Surface water samples were collected from overbank areas in Segment 10. The water quality values from Michigan Administrative Code, Rule 323.1057, were used to evaluate Kalamazoo River surface water. Water quality values are surface water quality standards.

2.6.5 Aquatic Background Concentrations

Some sediment R5 ESLs (see *Section 2.6.1*) used to evaluate aquatic exposures are based on total PNAs. An Aquatic Background Concentration (ABC) for overbank sediment was developed for total PNAs using the background data for overbank soil presented in *Table 2.* Comparison of results against the ABC is another line of evidence used to evaluate the potential correlation to background. The background sample locations are shown on *Figure 2*. This ABC was developed using the same method as the TBCs discussed in *Section 2.6.3*. The total sediment PNA concentrations calculated using the full detection limits for individual PNAs are compared to the ABCs. The total sediment PNA concentrations calculated using zero for non-detected concentrations are compared to the R5 ESLs for total PNAs.

The calculated ABC for Total PNAs is 153,361 ug/kg.

2.7 Aesthetics Evaluation

Aesthetic observations are based on a subjective evaluation of the effects of a physical or chemical characteristic that are not detrimental to human health (i.e., does not exceed established risk-based criteria). Aesthetic observations are those characteristics of a constituent which are observable (generally through sight or smell) and that may be objectionable to an individual who encounters them. Enbridge has performed an aesthetics evaluation for remaining Line 6B crude oil observations throughout the entire Segment 10 Spill Area.

To better understand what remaining aesthetic observations constituted, Enbridge and EGLE conducted a tour of the Kalamazoo River on May 11, 2016. Based upon this work and subsequent discussions, on October 17, 2016, EGLE issued a Technical Review Memorandum entitled *Enbridge Line 6B MP 608, Marshall, MI, Pipeline Release – Aesthetics Evaluation Process* (MDEQ Aesthetics Evaluation Technical Memorandum) (MDEQ, 2016c) in which they noted, *"Based on evaluations completed to date, aesthetics observations that may require further evaluation are limited to:*

- *Presence of tar patties, oil globules, or visible oil on the ground surface.*
- *Presence of visible oil observed within the top 6-inches of soil."*

The memorandum also provided a four step process for evaluating locations that met either of the two conditions listed above. This process included:

- Step 1 – Data Review: EGLE and Enbridge jointly reviewed and evaluated each aesthetic observation to determine if the observation was *de minimis* (no further action warranted) or if it required field verification (Step 2). The evaluation included previous excavation boundaries and depths, other aesthetic observations within 10 ft, and any other available field information not previously considered during the initial screening process.
- Step 2 – Field Verification: EGLE and Enbridge jointly conducted a field inspection of the aesthetic observations identified in Step 1 as requiring field verification. These locations were visually assessed to 6 inches below the ground surface (via hand auger borings and/or hand dug test pits) by the inspection team to determine if aesthetic observation remained. If the occurrence remained, is it of regulatory concern requiring further action (field delineation – Step 3) or *de minimis* (no further action warranted). All observations were documented with written documentation, Global Positioning System (GPS) coordinates, and photographic evidence to memorialize the current site conditions for use in NFA Reports.
- Step 3 Field Delineation: Inspection team performed a step-out evaluation (via hand auger borings and/or hand dug test pits) at locations where aesthetic observations remained (not considered *de minimis* in Step 2) to determine lateral extent. If the occurrence remained, is it of regulatory concern requiring further action (Actionable Determination - Step 4) or *de minimis* (no further action warranted). All observations were documented with written documentation, GPS coordinates, and photographic evidence to memorialize the current site conditions for use in future NFA Reports.
- Step 4 Actionable Determination: EGLE reviewed the remaining aesthetic observations that were not eliminated during Step 1 through Step 3 to determine if an actionable condition exists. EGLE provided these findings to Enbridge for review and discussion.

Results of this inspection are detailed in *Section 3.7* of this NFA Report.

3.0 Response and Characterization

This section summarizes the various response actions, investigations, remedial actions, and reporting that were completed to characterize the overbank portion of the Segment 10 Spill Area (MP 32.19 – MP 40.10). The RI Reach Reports for Reach 41 through Reach 48 (*Attachment B* through *Attachment I*) present detailed evaluation of the work conducted throughout Segment 10. Although no additional field characterization work was conducted after the RI Reports were issued, data was further evaluated to address sediment exceedances and the abandonment of monitoring wells. The abandonment work is documented in *Section 3.2.2*. This is followed by a discussion of fundamental issues (metals, GSIPC, PNA forensics, ecological evaluation, and aesthetics) for the project, which have been resolved as a result of Enbridge's response activities and remedial actions. A summary of EGLE comments to the Reach 41 through Reach 48 RI Reports is also provided along with a brief summary of current conditions in Segment 10. Overall, this section demonstrates that the conditions within the entire Segment 10 Spill Area are consistent with unrestricted residential use, and no further action is warranted.

3.1 Response Actions

Immediately following the Line 6B crude oil release on July 26, 2010, Enbridge performed a variety of initial response actions to contain and capture the majority of the Line 6B crude oil that was released. These activities were conducted in the Source Area, Talmadge Creek, and the Kalamazoo River. The initial response activities included a rapid mobilization of personnel and equipment to initiate immediate removal of the Line 6B crude oil from the environment. Specific response and interim activities in the Source Area, Talmadge Creek, and the Kalamazoo River included, but were not limited to the following:

- Shutdown of the pipeline and closures of pipeline isolation valves,
- Installation and operation of flumes (underflow weirs) down-gradient of the Line 6B crude oil release area,
- Installation and operation of Line 6B crude oil and water containment and recovery systems,
- Development and implementation of plans for remediation of the Source Area and downstream impacts,
- Excavation of impacted soils in the Source Area, Talmadge Creek, and downstream impacted areas,

- Development of a qualitative ecological characterization of Talmadge Creek and the Kalamazoo River,
- Sampling and analysis of private and public drinking water wells, and
- Use of visual assessment techniques to identify oiled shoreline and floodplain areas and recommend appropriate cleanup and/or treatment methods.

While the initial response actions were successful, many areas required additional cleanup and efforts were segregated into overbank work (addressed in the RI Reports and this NFA Report) and in-channel work (addressed under the Submerged Oil Program and not covered in this NFA Report).

For the overbank area, activities, investigations, and evaluations presented in the RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*) include SCAT, O&M activities, 2011 SORT, 2012 SORT, OSCAR program, OOR, excavation activities, KRRI, potable wells, public parks, public access, auxiliary sites, and the data gap assessment. During these efforts over 650 unsaturated and saturated soil samples, 130 sediment samples, 440 groundwater samples, and 9 surface water samples were analyzed for metals, PNAs, and/or VOCs. This data enabled comprehensive characterization of the overbank areas of Segment 10.

3.2 Post-Reach Report Activities

This section addresses sediment evaluation and well abandonment activities that were conducted in Segment 10 after the RI Reports were issued.

3.2.1 Sediment

As detailed in the RI Reports for Reach 45 and Reach 47 (*Attachment F* and *Attachment H),* results from six sediment samples showed an exceedance of the DCC for BAP (2,000 ug/kg) with concentrations ranging from 2,400 ug/kg to 4,300 ug/kg. The results of these samples are shown in the RI Report tables. These DCC exceedances were not fully addressed in the associated RI Reports and therefore are evaluated below using MLE.

- Three of the six sediment samples (SEKR3700I508, SEKR3700I510, and SEKR3700I511) are located near a soil sample (SBKR3700I501) addressed within the Forensics Process evaluation. The Forensics Analysis of SBKR3700I501 showed it was spatially isolated with a BAP maximum concentration less than 3%. This demonstrates the result was not attributable to Line 6B crude oil.

- All six of the sediment samples are spatially isolated from other samples.
- All six sediment samples are located in isolated areas, well removed from areas where human exposure could be reasonably expected on a routine basis. As detailed in *White Paper: Development of Human Health Evaluation Criteria for Overbank Areas*, submitted to EGLE on January 16, 2014 (Enbridge, 2014d) (*Attachment R*), the exposure frequency within the Part 201 default DCC is 245 days per year. This exposure frequency is not considered a realistic assumption for many of the areas along the Kalamazoo River and the sediment locations in particular. When the more realistic, yet still conservative assumption of 52 days is used, the resulting SSC was calculated to be 15,000 ug/kg. All six of the sediment samples in question had BAP concentrations less than a third of the calculated SSC.

Collectively, this analysis demonstrates that the sediment sample exceedances of DCC are isolated and reflect a *de minimis* condition. No further work is required to evaluate these results.

3.2.2 Well Abandonment

In late 2015, as Enbridge and EGLE concluded that the characterization work had satisfactorily documented conditions following response and remedial activities, it was acknowledged that monitoring wells installed as part of these efforts were no longer needed and should be abandoned prior to submittal of NFA Reports. A total of 12 monitoring wells were abandoned in the Segment 10 Spill Area, in 2016 and 2018. *Figure 4* depicts the locations of the wells and *Table 3* provides a tabulated summary of the well abandonment details.

The 12 monitoring wells were abandoned in accordance with the approved *Supplement to the Work Plan for Monitoring Well Abandonment,* submitted to EGLE on February 5, 2016 (Enbridge, 2016b). These work plans specified well abandonment methods as well as the wells to be abandoned. *Attachment U* contains copies of the well abandonment records.

3.3 Metals

As discussed in *Section 2.3*, evaluation of target metals Criteria exceedances was needed for soil, groundwater, and surface water samples. The text below evaluates the metal Criteria exceedances in both soil, groundwater, and surface water. While there was one groundwater sample with vanadium in excess of Criteria, EGLE concluded in the *Draft Review Comments for Remedial Investigation Report Reaches 41 through 48,* submitted to Enbridge on November 1, 2018 (MDEQ, 2018), that due to the lack of additional vanadium exceedances in

groundwater it is likely that the vanadium and molybdenum exceedances are the result of background conditions. Therefore, these locations are not a regulatory concern. There were no surface water metal exceedances in Segment 10. No additional evaluation is needed for metals in groundwater or surface water.

Enbridge used the background – foreground evaluation method developed by EGLE to evaluate the occurrence of target metals in soils. In Segment 10, this analysis focused on molybdenum. Vanadium, beryllium, and nickel were not included because there were no DWPC exceedances in Segment 10. The background – foreground evaluation shows that all locations with molybdenum detections in Segment 10 are either related to naturally occurring background conditions or have detections below DWPC, SPLP or Groundwater below Criteria. This evaluation is presented in the *Site Specific Background Metals Evaluation for Soil – Segment 10 (Reaches 41 - 48),* submitted to EGLE on January 24, 2020 (Enbridge, 2020) as part of this NFA Report and is included in *Attachment V*. As a result, no further action related to molybdenum detections in Segment 10 are necessary.

Based on the application of the MDEQ Background – Foreground Evaluation to data from Segment 10 as well as the conclusions of the Metals White Paper, no additional evaluation of metals in soil is needed for this NFA Report.

3.4 GSIPC

While there are very few GSIC exceedances reported in the groundwater and SPLP data, GSIPC exceedances are more frequent. As discussed in *Section 2.4*, an evaluation of the GSIPC exceedances has been conducted along the Kalamazoo River. Initially, Enbridge completed a point-by-point evaluation of GSIPC exceedances in Reach 16 through Reach 22 in 2017. The methodology was subsequently modified slightly and applied river wide. This section presents a high level overview of the results of the river wide evaluation.

The GSIPC for soil is very conservative, it is nearly 20 times lower than the GSIC for groundwater or the GSI soil-water partition value. A total of 211 unsaturated soil samples reported exceedances of the GSIPC along the Kalamazoo River.

At 121 of the 211 locations with GSIPC exceedances, there was one or more lines of supporting data available to evaluate if the pathway was complete. The supporting data are defined as follows:

- SPLP data from the parent soil sample,
- Co-located groundwater data (typically a temporary well at the location with a GSIPC exceedance), and
- Groundwater data within 25 ft (typically a temporary well at the location with a GSIPC exceedance).

The remaining 90 locations do not have SPLP, co-located groundwater data, or groundwater data within 25 ft from which to perform the evaluation.

For the 121 locations with the GSIPC exceedances and supporting data at least one, and in many cases all three of the above categories of supporting data show no GSI exceedance. This demonstrates that the pathway is incomplete. The only instance when this data did not support this conclusion were the results from samples located near the former MPG site in Battle Creek, Michigan.

The three PNAs that comprise 88% of the GSIPC exceedances are fluoranthene, naphthalene, and phenanthrene. These three constituents were further evaluated by their supporting data (SPLP, co-located groundwater, or groundwater within 25 ft). Analysis shows there is supporting data for most of the three PNAs as follows:

- Fluoranthene - 83 of the 140 (59%) locations with fluoranthene exceedances have either groundwater or SPLP supporting data. Of the 83 locations with supporting data, 81 show no GSIC exceedance, demonstrating the pathway is incomplete. The two locations that have an exceedance were collected from the MGP site in Battle Creek, Michigan.
- Naphthalene - 23 of the 29 (79%) locations with naphthalene exceedances have either groundwater or SPLP data. Of the 23 locations with supporting data, 22 show no GSIC exceedance, demonstrating the pathway is incomplete. The one location that has an exceedance was collected from the MGP site in Battle Creek, Michigan.
- Phenanthrene - 98 of the 175 (55%) locations with phenanthrene exceedances have either groundwater or SPLP data. Of the 98 locations with supporting data, 97 show no GSIC exceedance, demonstrating the pathway is incomplete. The one location that has an exceedance was collected from the MGP site in Battle Creek, Michigan.

The supporting data provides a robust evaluation showing that the GSIPC exceedances in soil are not leaching into groundwater. The groundwater surface water interface pathway is not

complete. The only location where there is a potential for leaching from soil to groundwater was at the former MGP in Battle Creek, Michigan.

Of the 211 GSIPC exceedance locations along the Kalamazoo River, 121 locations have supporting data showing the pathway is incomplete. Through the lines of evidence presented above and in the technical memorandum, Enbridge believes the remaining 90 exceedance locations would show the same conclusion if supporting data was available. Enbridge believes that no further action is warranted at the remaining 90 exceedance locations. Furthermore, none of the remaining 90 exceedance locations are within Segment 10. The results of this evaluation are presented in detail in the *GSIPC Evaluation and Write-Up,* submitted to EGLE on May 2, 2019 (Enbridge, 2019) and included in *Attachment Q*.

3.5 Forensics Process

Since 2010, Enbridge and EGLE have worked together closely to evaluate and address the PNA exceedances in soil within the Spill Area using a variety of approaches. In 2015, Enbridge compiled these efforts into the Urban PAH White Paper. After EGLE expressed concerns with the conclusions presented in the Urban PAH White Paper, Enbridge and EGLE developed a revised forensic approach. This comprehensive effort involved a series of meetings with EGLE between June 2016 and August 2017 during which both parties brought in recognized experts in forensic chemistry to refine the forensics approach. During the December 15, 2016 meeting, EGLE proposed a draft four-step process for evaluating the PNAs. The draft process evolved into the Modified Additional Forensics Approach during the fall of 2017. The process was again revised slightly in December 2017 and developed into its final form in what is now referred to as the Forensics Process. The Forensics Process and the associated five steps, are fully explained in *Section 2.5*, and focuses the evaluation of PNA results exceeding Criteria (excluding excavated, duplicates, and split samples) to those samples that reflect potential impact from Line 6B crude oil (*Figure 3*). The following subsections present a detailed evaluation of the soil samples collected in Segment 10 using the Forensics Process.

3.5.1 Step 1 – Comparison to DCC

All 657 Segment 10 soil sample results were screened against the BAP DCC of 2 mg/kg. One sample was identified as exceeding the DCC.

Figure 5 depicts the numerous sample locations where BAP was below the DCC and shows the one location that required further evaluation using Step 2 of the Forensics Process. *Table 4* lists the one sample.

3.5.2 Step 2 – Spatial Evaluation

The geo-spatial location of the one remaining location was evaluated to eliminate locations that were determined to be isolated. Locations were determined to be isolated if nearby samples showed no DCC exceedances, or if nearby samples with similar BAP DCC exceedances have been shown to not be attributable to Line 6B crude oil.

Figure 6 depicts the one location that was confirmed to be isolated.

3.5.3 Forensics Conclusions

Enbridge, working closely with EGLE, has undertaken extensive analyses to evaluate whether Line 6B crude oil is a significant source of PNAs within the Spill Area. While there are other PNAs that have exceeded Criteria, BAP has the largest number of exceedances and was therefore the focus of the forensics evaluation.

Overall, the forensics analysis and application of the Forensics Process shows that the one sample within Segment 10 with a BAP DCC exceedance was eliminated as being geo-spatially isolated. As a result, no further evaluation of the samples is required.

3.6 Ecological Evaluation

In the RI Reports, the R5 ESLs (U.S. EPA, 2003) and SSLs (U.S. EPA, 2014b) were used to screen saturated and unsaturated soils for potential terrestrial ecological risks. R5 ESLs were used for VOCs and SSLs were used for PNAs.

In EGLE comments on the RI Reports (see *Attachment V*), it was noted that 95 soil samples and 101 sediment samples exceeded R5 ESLs for one or more PNAs. However, as noted in *Section 2.6.1*, SSLs are preferred for screening evaluations and SSLs are available for two groups of PNAs: LMW PNAs with fewer than four aromatic rings and HMW with four or more aromatic rings. The SSL for LMW PNAs are based on toxicity to soil invertebrates, primarily springtails, and earthworms. The SSL for HMW PNAs are based on toxicity to mammals (e.g., rabbits, mice, rats, etc.) (U.S. EPA, 2007).

To maintain a complete, more holistic assessment, the ecological evaluation has been expanded to evaluate potential terrestrial ecological impacts associated with overbank soil and potential aquatic ecological risks associated with overbank sediments and surface water in the Segment 10 Spill Area. This evaluation uses screening levels specific to each medium

(*Section 2.6*) as well as the Forensics Process (*Section 2.5*) to eliminate samples not attributable to Line 6B crude oil.

R5 ESLs and low-effect SSLs are not cleanup criteria, but are lines of evidence used to evaluate the potential for ecological impacts. Concentrations of hazardous substances that exceed the screening levels are further evaluated using other lines of evidence to determine if they are related to Line 6B crude oil or to pre-existing urban background conditions and to determine if the concentrations are *de minimis* in relation to measurable impacts on exposed populations of terrestrial or aquatic life.

Ecological impacts related to sediment and surface water in the Kalamazoo River are addressed separately in the *Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on April 25, 2014 (Enbridge, 2014a) and the *Addendum to the Potential Chronic Effects of Line 6B Residual Oil Report of Findings,* submitted to EGLE on October 30, 2015 (Enbridge, 2015b).

3.6.1 Terrestrial Ecological Impacts

This section evaluates potential terrestrial ecological impacts in soil within the Segment 10 Spill Area. Response actions coupled with restoration activities have restored Segment 10 to conditions as good or better than they were prior to the Line 6B crude oil release. The evaluation shows that remedial actions are complete based on sample results being less than screening levels and other lines of evidence applied to individual sample results and to collective results from the Segment 10 Spill Area. The other lines of evidence are:

a. VOC concentrations in soil that are equal to or less than R5 ESLs, and PNA concentrations that are equal to or less than low-effect SSLs (see *Section 2.6.2)*,
b. The location was determined to be isolated based on Step 2 of the Forensics Process evaluation of DCC exceedances,
c. The land area represented by this single sample is much smaller than the typical range of the shrews used to develop the low-effect SSL.
d. Total LMW PNA and/or Total HMW PNA concentrations do not exceed terrestrial background concentrations from overbank soil upstream of the Line 6B crude oil release,
e. The chemical concentrations and/or spatial distributions of concentrations are *de minimis* in frequency and magnitude relative to ecological exposures and receptors; and,
f. Other relevant evidence as discussed in text.

3.6.1.1 PNAs Exceeding Screening Levels:

PNA concentrations exceeded ecological screening levels in 3 of 647 samples (less than 0.5%). The PNA section of *Table 5* identifies the three samples with PNA concentrations above the:

- R5 ESLs,
- Low-effect SSL for HMW PNAs, and/or
- Terrestrial Background Concentrations.

Figure 7, depicts the distribution of all soil samples in Segment 10 and segregates them for purposes of the terrestrial evaluation as:

- Those that do not exceed the HMW SSL,
- Those that exceed the HMW SSL but were eliminated using the Forensics Process, and
- Those that exceed the HMW SSL but were evaluated using other lines of evidence.

While three samples exceed the BAP R5 ESLs for PNAs listed on the table, the U.S. EPA and EGLE prefer to evaluate PNAs using the Total LMW PNAs and Total HMW PNAs low-effect SSLs.

For Total LMW PNAs concentrations, *Table 5* shows that none of the sample results exceeded the low-effect SSL. As a result, no additional evaluation is needed for Total LMW PNAs in the Segment 10 Spill Area.

For Total HMW PNA concentrations, 644 of the 647 samples (approximately 99.5%) did not exceed the low-effect SSL and no additional evaluation of those samples is needed. Total HMW PNA concentrations did exceed the low-effect SSL in 3 of the 647 samples (less than 0.5%). *Table 5* presents the tabulated results for these three samples and includes the lines of evidence used to evaluate each sample.

The first line of evidence in the Forensics Process is the sample comparison to the BAP DCC. This approach showed two of the three samples with total HMW PNA concentrations exceeding the low-effect SSL had BAP concentrations that did not exceed the DCC and were not evaluated further using the Forensics Process. The one remaining sample is discussed below. The remaining single sample (one location) exceeded the DCC and was evaluated using the Forensics Process. Step 2 of the Forensics Process (*Section 2.5.2*) showed that the sample exceeding the BAP DCC was isolated and no additional evaluation of the sample is needed.

The remaining two samples had BAP concentrations below the DCC. The remaining two samples were evaluated below using multiple lines of evidence:

- As listed on *Table 5*, neither of the two remaining samples exceeded the TBC for any of the PNAs.
- As shown on *Figure 7,* all three sample locations are sporadically distributed throughout Segment 10.
- The land area represented by these two samples is much smaller than the typical range of the shrews used to develop the low-effect SSL (*Section 2.6.2*).

Collectively these additional lines of evidence show that the low-effect soil screening level exceedances for HMW PNAs represent a *de minimis* condition which requires no additional evaluation.

3.6.1.2 VOCs Exceeding Screening Levels

None of the soil samples exceeded screening levels. As a result, no additional evaluation is needed to address these exceedances.

3.6.2 Aquatic Ecological Impacts

This section evaluates the Segment 10 Spill Area overbank surface water and sediment analytical data.

3.6.2.1 Surface Water

A total of seven surface water samples were collected in the Segment 10 Spill Area. Results from these samples were addressed in the specific RI Reports where the samples were collected. Results from the surface water sampling reported no exceedances of EGLE Rule 57 Water Quality Standards. No further evaluation of surface water impacts within the Segment 10 Spill Area is warranted.

3.6.2.2 Sediment

PNA concentrations exceeded ecological screening levels in 101 of 138 overbank sediment samples collected in Segment 10 (approximately 73%). *Figure 8* depicts the 101 samples (94 locations). *Table 6* compares sediment analytical data for the 101 samples to the screening levels.

The overbank sediment data are evaluated using R5 ESLs and PECs (see *Section 1.8.2)*. The R5 ESLs for sediment are “protective benchmarks” developed by the U.S. EPA (U.S. EPA, 2003).

Individual R5 ESLs have been developed for some VOCs as well as both individual and total PNAs. The PECs are concentrations above which adverse effects on benthic organisms are likely to occur (MacDonald et al., 2000). The PECs are always greater than the R5 ESLs. PECs have been developed for both individual and total PNAs. Conclusions regarding overbank sediments for PNAs are based on comparison to total PNA PECs, while conclusions for VOCs are based on the R5 ESLs. Other lines of evidence are also used to evaluate concentrations that exceed the screening levels.

3.6.2.3 PNAs Exceeding Screening Levels

PNA concentrations exceeded one or more of the R5 ESLs in 101 of the 138 sediment samples. Of the 101, 77 of these samples did not exceed any of the PECs and 96 of the samples did not exceed the Total PNA concentration for PECs. Furthermore, none of the sediment samples exceeded the ABC. Collectively, this analysis demonstrates that the sediment samples that exceed the screening levels reflect a *de minimis* condition. No further work is required to evaluate these results.

3.6.2.4 VOCs Exceeding Screening Levels

VOC concentrations in the Segment 10 Spill Area overbank sediments did not exceed the R5 ESLs for compounds related to Line 6B crude oil. As a result, no further evaluation is needed.

3.7 Soil and Groundwater Qualitative Aesthetic Evaluation

Despite extensive response and remedial actions conducted throughout the Segment 10 Spill Area, observations of residual Line 6B crude oil artifacts may remain.

To evaluate these potential remaining aesthetics, Enbridge has reviewed the extensive and carefully documented records (e.g., boring logs, groundwater sampling forms, field notes) generated during investigation activities to identify potential remaining aesthetic observations. Within Segment 10, Enbridge and EGLE have worked closely together to determine how to evaluate the potential remaining aesthetic observations. The brief overview of the history of this process and the evaluation conducted between EGLE and Enbridge is presented in *Section 2.7*.

In summary, Enbridge has reviewed records from over 1,400 locations and initially identified 17 locations where aesthetic observations (visible oil, sheen, or odor) were recorded in the RI Reports for Reach 41 through Reach 48.

EGLE and Enbridge routinely reviewed and discussed the potential remaining aesthetic observations throughout 2015 and the MDEQ Aesthetics Evaluation Technical Memorandum was submitted to Enbridge in October 2015. The following subsections summarize the findings of this evaluation as well as the aesthetics inspection that was jointly conducted by Enbridge and EGLE.

3.7.1 Groundwater Aesthetic Evaluation

The groundwater aesthetic evaluation compared groundwater analytical results from Segment 10 to the aesthetic DWC (based on taste and odor). The groundwater analytical data from the RI Reports for Reach 41 through Reach 48 is presented in *Attachment B* through *Attachment I,* respectively. No groundwater samples collected from Segment 10 contained organic constituents attributable to Line 6B crude oil at concentrations exceeding the aesthetic DWC. No additional evaluation or action is necessary.

3.7.2 Surficial and Subsurface Aesthetic Evaluation

A detailed aesthetic evaluation was conducted for the potential remaining surficial and subsurface aesthetic observations in Segment 10. The surficial and subsurface observations were documented in the RI Reports for Reach 41 through Reach 48 (presented in *Attachment B* through *Attachment I*). Following publication of the MDEQ Aesthetic Evaluation Technical Memorandum, four locations within Segment 10 were identified for further evaluation by EGLE. The four locations (located specifically in Reach 42 and Reach 45) are listed below:

- SBKR3425L503,
- SEKR3450R502,
- SEKR3475RR501, and
- SBKR3700I507.

On May 14, 2019, an aesthetic inspection was jointly conducted by Enbridge and EGLE in Reach 42 and Reach 45. Each of the four locations discussed above were evaluated for both surficial and subsurface aesthetic observations during the site visit which included a surface inspection and spot evaluation of the top 0.5 ft of soil. No aesthetic observations were noted during the inspection of the four locations. Aesthetic inspection sign-off sheets signed by both Enbridge and EGLE representatives document that no remaining actionable aesthetics, as described in the MDEQ Aesthetic Evaluation Technical Memorandum, were observed. The aesthetics sign-off sheets as well as photos from the inspection, are included in *Attachment X*. The inspections found no remaining aesthetic conditions that would impair the use or enjoyment

of the property. No additional work or evaluation is needed to address potential remaining aesthetics in Segment 10.

3.7.3 Qualitative Aesthetic Conclusions

Overall, this evaluation demonstrates that while potential remaining aesthetic observations may exist, they are not present at the ground surface in the Segment 10 Spill Area. No actionable aesthetic condition remains within the Segment 10 Spill Area. The potential remaining aesthetic conditions are confined to the subsurface and are isolated and discontinuous. They represent *de minimis* aesthetic conditions and are not actionable aesthetic concerns; therefore, no further action is warranted.

3.8 Conclusions

Segment 10 has undergone extensive emergency response actions, characterization, excavations, and restoration. Detailed discussions of the activities are presented in the RI Reports for Reach 41 through Reach 48 (*Attachment B* through *Attachment I*). Additional work addressing post-reach report data (*Section 3.2*), the metals background – foreground evaluation (*Section 3.3*), the GSIPC river-wide evaluation (*Section 3.4*), the Forensics Process (*Section 3.5*), Ecological Evaluation (*Section 3.6*), and aesthetics evaluations (*Section 3.7*) are summarized in this NFA Report.

Results from the activities performed to date, demonstrate that overbank soil, sediment, groundwater, and surface water in the Segment 10 Spill Area have been thoroughly and comprehensively characterized. These data are suitable for evaluations as to the adequacy of remedial actions, the nature of aesthetic observations, and risk assessments to allow evaluation of the Segment 10 Spill Area for an unrestricted no further action finding in accordance with Section 20114d(3)(a) of Part 201.

4.0 Basis for Concluding Remedial Action is Complete

In accordance with Part 201, Section 20114d(2), this section documents the basis that remedial actions are complete in Segment 10 and conditions are consistent with unrestricted residential land use. This is accomplished by evaluating the data and documenting that concentrations of hazardous substances in Segment 10 that originated from the Line 6B crude oil release satisfy the cleanup criteria for unrestricted residential use. This provides the basis for concluding that remedial actions in Segment 10 are complete.

Conclusions that remedial actions are complete are based on one or more of several lines of evidence applicable to each medium, exposure pathway and chemical as follows:

- The chemical is not a constituent of the Line 6B crude oil release (*Section 1.4*),
- The location and depth of a soil sample which exceeded a Criteria was subsequently excavated (RI Reports for Reach 41 through 48 (see *Attachment B* through *Attachment I*, respectively),
- Concentrations are equal to or less than Criteria (*Section 1.8*),
- Concentrations of BAP, fluoranthene, and phenanthrene occasionally exceed Criteria, however, these compounds are found at similar concentrations within the Kalamazoo River floodplain soil and sediment upstream of the Spill Area (*Section 2.5)*,
- PNA concentrations exceeding Criteria (BAP, fluoranthene, and phenanthrene) have been addressed through the Forensic Process, the Urban PAH White Paper, and SSC (*Section 3.5*),
- Concentrations in overbank sediments are typically equal to or less than DCC and sediment PECs. Those that are greater than DCC and/or PECs are addressed through MLE (*Section 3.6.2.3*),
- The concentrations in co-located or nearby SPLP samples did not exceed DWC or GSIC (*Section 3.4,* and RI Reports for Reach 41 through Reach 48, see *Attachment B* through *Attachment I*, respectively),
- The concentrations in co-located or nearby groundwater samples did not exceed DWC or GSIC (*Section 3.4*),
- Concentrations of target metals exceeding Criteria reflect background conditions and are not attributable to Line 6B crude oil (see *Section 3.3*),

- None of the overbank soil samples reported individual PNA or total LMW or HMW PNA concentrations at concentrations exceeding TBCs (upstream of the Line 6B crude oil release) samples (*Section 3.6.1.1*),
- Total LMW PNA concentrations in overbank soil samples do not exceed low-effect soil screening levels (*Section 3.6.1.1*) and Total HMW PNA concentrations exceed the low-effect soil screening levels in less than 0.5% of the samples.
- VOC concentrations in soil are equal to or less than R5 ESLs, and PNA concentrations are equal to or less than low-effect SSLs (*Section 3.6.1.2*),
- The chemical concentrations and or spatial distributions of concentrations are *de minimis* relative to human and ecological exposures and receptors, and
- Other relevant and applicable evidence.

Organization of this section is generally consistent with Section E ("Are/were the following present at the facility") of the *Request for DEQ of No Further Action (NFA) Report* (form EQP 4030), which is presented in *Attachment A*. The principle exception to this organization is soil and groundwater aesthetics, which are combined in one section. The basis and conclusions are presented for each sub-section below.

4.1 Mobile or Migrating NAPL

During the Line 6B crude oil release, NAPL was carried from the primary source area into Segment 10 with surface water flow from Talmadge Creek into the Kalamazoo River. Extensive response activities in 2010 through 2012 removed residual secondary sources of NAPL, including any NAPL body and the potential for mobile and migrating NAPL from Segment 10.

Extensive characterization and confirmation sampling conducted from 2011 through 2015 show that while trace residual Line 6B crude oil release-related constituents may remain in the soil, they are not leachable as evidenced by the minimal SPLP exceedances of Criteria, and complete absence of groundwater exceedances of Criteria for PNAs and VOCs related to Line 6B crude oil. In addition, as discussed in *Section 2.1* no NAPL has been observed in any temporary well or monitoring well installed in the Segment 10 Spill Area. NAPL mobility testing across the Spill Area, demonstrates that residual NAPL is not mobile nor is it a source of groundwater impact. The NAPL White Paper (*Attachment O*), while more broadly focused over the entire Spill Area, supports this finding.

Conclusion: All impacts related to the Line 6B crude oil release have been addressed and there is no mobile or migrating NAPL remaining. Any remaining residual impacts would only be reflected as scattered and isolated observations of sheen and/or visible oil (see *Attachment X*). These aesthetic conditions do not constitute mobile or migrating NAPL. Remedial action is complete because there is no mobile or migrating NAPL remaining and the residual NAPL is not a source of dissolved impact.

4.2 Soil Contamination Above Residential Criteria

This section evaluates potential human health impacts associated with direct contact with soil, soil impacts to groundwater, and emission of particulate matter from soil. PNA and VOC analytical data for unsaturated soil samples are compared to generic residential Criteria (DCC, DWPC, GSIPC, and PSIC) while saturated soil and sediment data are compared to residential DCC. Owing to the widespread distribution of PNAs in floodplain soil along the Kalamazoo River, including background areas upstream of the Line 6B crude oil release, the Forensics Process was developed to evaluate BAP and, by association any related high molecular weight compounds. This approach showed the Line 6B crude oil was not contributory to most exceedances and that those few samples where Line 6B crude oil may have been partially contributory to exceedances represent isolated and *de minimis* conditions.

Overall, PNAs were analyzed in 647 soil samples from Segment 10 locations, including 35 saturated samples and 612 unsaturated samples. VOCs were also analyzed in approximately 146 samples (depending on the analyte), and all 146 samples were unsaturated.

This section concludes that remedial actions related to these Criteria and pathways in overbank soil from the Segment 10 Spill Area are complete.

4.2.1 Direct Human Contact

Soil direct contact is a potentially complete and relevant exposure pathway. This section compares saturated and unsaturated Segment 10 soil data to DCC and concludes that response actions related to direct contact are complete.

Direct contact with sediment is also a potentially complete exposure pathway, although exposure would be less frequent than direct contact with soil. This section also compares Segment 10 sediment data to DCC and concludes that remedial action related to direct contact with sediment is complete.

4.2.1.1 Saturated and Unsaturated Soil

DCC were not exceeded in 646 of 647 overbank saturated and unsaturated soil samples. The remaining sample that exceeded DCC was addressed using the Forensic Process which showed that the sample was isolated from other samples and requires no further evaluation.

Conclusion: Remedial actions related to direct contact with soil in the Segment 10 Spill Area are complete because concentrations are less than DCC, locations exceeding the DCC are not attributable to Line 6B crude oil, were excavated, or were addressed through the Forensics Process.

4.2.1.2 Sediment

Only six of the 138 sediment samples reported DCC exceedances for PNAs. The six samples are addressed in *Section 3.2.1* where MLE demonstrate that these exceedances represent an isolated and *de minimis* condition. These locations warrant no further evaluation or action.

VOC concentrations in Segment 10 overbank sediment samples did not exceed DCC in any of the samples and requires no further evaluation.

Conclusion: Remedial actions with respect to direct contact with Segment 10 overbank sediments are complete because the PNA and VOC concentrations did not exceed DCC.

4.2.2 Drinking Water Protection

Groundwater used as a drinking water source impacted by leaching from soil is a potentially complete and relevant exposure pathway. This section evaluates potential impacts of Line 6B crude oil on groundwater and concludes remedial action is complete.

DWPC were not exceeded in any of 613 overbank unsaturated soil samples and remedial actions with respect to DWPC in these samples are complete

Conclusion: Remedial actions with respect to DWPC are complete because concentrations do not exceed DWPC.

4.2.3 Groundwater Surface Water Interface Protection

Discharge of groundwater impacted by leaching from soil to surface water is a potentially complete and relevant exposure pathway. This section evaluates potential human health and aquatic life impacts associated with chemicals leaching from soil to groundwater. Remedial action is complete for the reasons given below.

GSIPC were not exceeded in any of 613 overbank unsaturated soil samples analyzed for PNAs and VOCs and remedial actions with respect to GSIPC in these samples are complete. In addition, the river-wide GSIPC analysis presented in *Section 3.4* of this NFA Report shows that across the Spill Area these GSIPC exceedances do not represent a potential impact to groundwater or surface water.

Conclusion: Remedial actions in the Segment 10 Spill Area related to potential human health impacts associated with GSIPC exceedances in soil are complete. No threat to human health or the environment exists, and no further evaluation or action is required.

4.2.4 Particulate Soil Inhalation Criteria

Inhalation of soil particulates is a potentially complete and relevant exposure pathway. Concentrations of all analyzed parameters in soil do not exceed the PSIC.

Conclusion: Remedial actions in the Segment 10 Spill Area related to potential human health impacts associated with particulate emissions from soil are complete because concentrations of all Line 6B crude oil related constituents in soil do not exceed PSIC.

4.2.5 Soil Aesthetic Impacts

The instances where potential aesthetic impacts have been observed in Segment 10 have dramatically decreased as a result of remedial efforts and natural degradation. As a result, only limited instances of sheen in soil cores or borehole/purge water, odor in soil, or visible oil within soil core or on borehole water (observed over seven years ago during sample collection activities) potentially remain. No surficial visible oil or sheen remains in Segment 10. Aesthetics inspections and evaluation with EGLE and Enbridge personnel conducted on May 14, 2019 visited four locations where EGLE felt potential aesthetic observations may have remained. No oil (visible or globules) or tar patties were observed on the ground surface and no visible oil was observed within the top 6 inches of the soil column. The absence of aesthetic observations at these locations demonstrates that aesthetic impacts have been adequately addressed.

In addition, the topography of areas disturbed during response activities has been restored to conditions that existed before the Line 6B crude oil release. Disturbed areas have also been re-vegetated with native plants.

As described in *Section 3.7,* a comprehensive review of field records evaluated potential remaining aesthetic observations in surface water, groundwater, sediment, and soil. The extremely limited frequency and isolated nature of the potential aesthetic observations represents a *de minimis* condition which requires no further action in Segment 10. The infrequent observations of visible oil, sheen, and/or odor in subsurface soil samples are not an actionable aesthetic concern.

Conclusion: No actionable aesthetic conditions remain in soil within Segment 10. The limited, isolated, and sporadic observations of visible oil, sheen, or odor in subsurface soils are not actionable aesthetic concerns.

4.3 Groundwater Contamination Above Residential Criteria

This section compares the Segment 10 Spill Area groundwater data to DWC, GSIC and GVIAIC and concludes remedial action is complete.

Groundwater samples were collected and analyzed from numerous wells in Segment 10 including:

- A total of 114 temporary wells and 12 monitoring wells (with up to six separate sampling events).
- There are 40 potable wells in Segment 10, and 21 of these are within 200 ft of the inundation line.

Well locations and specific analytical results are summarized in the RI Reports.

No PNAs or VOCs related to the Line 6B crude oil release were detected in any groundwater samples collected from potable wells, temporary wells or monitoring wells installed in or near the Segment 10 Spill Area. No further evaluation of this result is needed.

Conclusion: Remedial actions in Segment 10 related to potential human health impacts to groundwater are complete. Concentrations of Line 6B crude oil related constituents in groundwater do not exceed Criteria; therefore, no threat to human health or the environment exists, and no further evaluation or action is required.

4.4 Groundwater Aesthetics

The groundwater aesthetic evaluation compared groundwater analytical results from Segment 10 to the aesthetic DWC. The groundwater analytical data are presented in RI Reports for Reach 41 through Reach 48 (see *Attachment B* through *Attachment I*, respectively). No groundwater

samples collected from Segment 10 contained concentrations exceeding the aesthetic DWC. No additional evaluation or action is necessary.

Other than the chemical-specific aesthetic criteria, groundwater aesthetic concerns are not defined by Part 201, Part 201 administrative rules, or Part 201 guidance documents. Visible oil and sheen were historically observed on borehole and purge water at a number of locations. These specific observations are holistically addressed in the qualitative aesthetic evaluation in *Section 3.7*, where it is demonstrated that the observations are not actionable aesthetic concerns.

Conclusion: No actionable aesthetic concerns are present with regard to groundwater exceeding DWC within the Segment 10 Spill Area; therefore, no further action is warranted. The qualitative visual and olfactory aesthetic observations are addressed in *Section 3.7*.

4.5 Soil Gas Contamination Above Residential Vapor Intrusion Screening Levels

This section evaluates potential human health impacts associated with soil gas contamination above residential vapor intrusion screening levels.

4.5.1 Soil Volatilization to Indoor Air Inhalation Criteria

Soil volatilization to indoor air is a potentially complete and relevant exposure pathway. There are no unsaturated soil or groundwater samples collected from Segment 10 that exceeded the SVIAIC or GVIAIC, respectively. No additional evaluation or action is necessary.

Conclusion: Remedial actions in Segment 10 related to potential volatilization of Line 6B crude oil constituents from soil to indoor air are complete because concentrations of Line 6B crude oil related constituents in the Segment 10 Spill Area in soil do not exceed SVIAIC; therefore, no further action is warranted.

4.5.2 Volatile Soil Inhalation Criteria

Soil volatilization to ambient air is a potentially complete and relevant exposure pathway. There are no unsaturated soil samples collected from Segment 10 contained concentrations exceeding the VSIC. No additional evaluation or action is necessary.

Conclusion: Remedial actions in the Segment 10 Spill Area related to potential volatilization of Line 6B crude oil related constituents from soil to ambient air are complete because concentrations of Line 6B crude oil related constituents in the Segment 10 Spill Area in soil do not exceed VSIC; therefore, no further action is warranted.

4.6 Conditions Immediately Dangerous to Life and Health

Acute toxic hazards are related to inhalation of high chemical concentrations in air. Soil and groundwater sample results do not exceed SVIAIC, VSIC, or GVIAIC. These criteria protect human health, including conditions immediately dangerous to life and health, from exposure to air. No additional evaluation or action is necessary.

Conclusion: Remedial actions in the Segment 10 Spill Area related to conditions immediately dangerous to life and health are complete because concentrations of Line 6B crude oil related constituents in Segment 10 soil do not exceed SVIAC and VSIC, and concentrations in groundwater do not exceed GVIAIC; therefore, no further action is warranted.

4.7 Fire and Explosive Hazards Related to the Line 6B Crude Oil Release

Fire and explosion hazards are potentially complete and relevant exposure pathways. A comparison of the Segment 10 Spill Area unsaturated soil data to FESL shows the concentrations detected are well below the FESL. No additional evaluation or action is necessary.

Conclusion: All results from the Segment 10 Spill Area sample analyses demonstrate no exceedances of the FESL; therefore, no fire or explosion hazard related to the Line 6B crude oil release exists.

4.8 Contamination to Existing Drinking Water Supply

Contamination to existing drinking water supply was considered a potentially complete exposure pathway. To address this, monitoring wells were installed and potable wells in or near the Segment 10 Spill Area were sampled periodically (monthly to bi-monthly shortly after the Line 6B crude oil release, and then quarterly to semi-annually). Groundwater analytical results from these wells were all below Criteria for VOCs and PNAs associated with the Line 6B crude oil. As a result, contamination of existing drinking water supply is not a potentially complete exposure pathway. Exceedances of Criteria in the potable well samples were limited to metals resulting from naturally occurring, pre-existing groundwater geochemical conditions and, at one location, vinyl chloride, which is not a Line 6B crude oil constituent. The Metals White Paper presented in *Attachment M* concluded that metals are not associated with the Line 6B crude oil. The Michigan Department of Community Health document entitled *Kalamazoo River/Enbridge Spill: Evaluation of crude oil release to Talmadge Creek and Kalamazoo River on residential drinking water wells in nearby communities (Calhoun and Kalamazoo Counties, Michigan)*, prepared on

February 27, 2013 (Drinking Water Assessment) (MDCH, 2013) concluded that wells within 200 ft of the inundation zone have not been, nor are likely to be, adversely impacted by the Line 6B crude oil release.

Conclusion: Concentrations of Line 6B crude oil related constituents in groundwater do not exceed DWC in existing drinking water supplies; therefore, there is no contamination to existing drinking water supplies requiring further action.

4.9 Imminent Threat to Drinking Water Supply

The Kalamazoo River is not a water source for public or community water supplies. While some groundwater in the Segment 10 Spill Area is used for a potable supply, soil and groundwater sampling have demonstrated that there is no threat to existing drinking water supplies. The Drinking Water Assessment concluded that wells within 200 ft of the inundation zone have not been, nor are likely to be, adversely impacted by the Line 6B crude oil release. Private potable wells are not impacted with Line 6B crude oil related constituents. Potable wells are discussed in the RI Reports for Reach 41 through 48 (see *Attachment B* through *Attachment I*, respectively).

Conclusion: Concentrations of Line 6B crude oil related constituents in soil and groundwater do not pose a threat to drinking water requiring further action; therefore, no further action is warranted.

4.10 Impact to Surface Water

Groundwater migration to surface water is a potentially complete and relevant exposure pathway. No PNAs or VOCs related to the Line 6B crude oil release exceeded GSIC in any groundwater samples collected from temporary wells or monitoring wells installed in the Segment 10 Spill Area.

Soil runoff to surface water is a potentially complete and relevant exposure pathway. Surface soil containing concentrations of chemicals that exceed GSIPC could potentially erode and be deposited in adjacent surface water, where leaching could occur. However, as demonstrated in the analysis presented in the RI Reports for Reach 41 through Reach 48, as well as *Section 4.2.3,* these constituents are not related to the Line 6B crude oil or leaching has not occurred.

Conclusion: Remedial action with respect to potential groundwater and soil impacts on surface water are complete because the constituents in groundwater do not exceed GSIC (this pathway

is addressed in *Section 4.2.3*) and the constituents in soil do not leach or are not Line 6B crude oil related constituents; therefore, no further action is warranted.

4.11 Ecological Impacts

The detailed ecological evaluation is presented in *Section 3.6*. This section presents a summary of the evaluation to address potential terrestrial ecological impacts associated with overbank soil and potential aquatic ecological risks associated with overbank sediments and surface water in Segment 10. The ecological screening levels, presented in *Section 1.8.2,* are not cleanup criteria. Concentrations of hazardous substances that exceed the screening levels are further evaluated to determine if they are related to Line 6B crude oil or to pre-existing background conditions and to determine if the concentrations are *de minimis* in relation to measurable impacts on exposed populations of terrestrial or aquatic life. Results of the comparison to screening levels and evaluations show that no further action is needed to address terrestrial and aquatic ecological impacts in Segment 10.

4.11.1 Terrestrial Ecological Impacts

More than 650 saturated and unsaturated soil samples were collected across the entirety of Segment 10, and only three of these samples reported exceedances of the Low-Effect SSLs for HMW PNAs. There were no exceedances of the Low-Effects SSL for LMW PNAs. These are the preferred screening levels for evaluating PNAs. As detailed in *Section 3.5*, one of the three samples exceeding the Low-Effect SSL for HMW PNAs was evaluated through the forensics process and the PNAs in the sample is not attributable to Line 6B crude oil. The remaining two samples were addressed through MLE, which showed they did not exceed the low-effect SSL for LMW PNAs, nor the TBC for LMW or HMW PNAs. Overall, the Forensics Process and MLE analysis show the samples with screening level exceedances represent an isolated and *de minimis* condition. Therefore, no additional investigation or remediation is required.

Conclusions: Remedial actions and evaluations with respect to Line 6B crude oil constituents and terrestrial ecological exposures to Segment 10 saturated and unsaturated soil are complete. As noted above, most screening level exceedances are either not attributable to Line 6B crude oil or comprise a *de minimis* condition, either because the exceedances are isolated or because the proportion of the exceedance that may be attributable to Line 6B crude oil is very small (less than 1%). Based on this analysis, no additional actions are needed to address the terrestrial ecological impacts associated with the very limited terrestrial exceedances.

4.11.2 Aquatic Ecological Impacts

This section addresses surface water and sediment samples with concentrations of Line 6B crude oil constituents that exceed the aquatic screening levels, more specifically R5 ESLs and PECs. The evaluation shows that the limited exceedances of screening levels are *de minimis* and do not require additional investigation or remediation.

A total of 101 overbank sediment samples exceeded the R5 ESLs. However, only 24 of these samples exceeded one or more PECs and only five exceeded the Total PNA concentrations for PECs. Based on this evaluation the exceedances are considered a *de minimis* condition that does not require additional investigation or remediation.

A total of seven surface water samples were collected across the Segment 10 Spill Area, and there were no reported exceedances of EGLE Rule 57 Water Quality Standards. Based on these findings, no additional investigation or remediation is required.

Conclusions: Remedial actions and evaluations with respect to Line 6B crude oil constituents and sediment and surface water ecological impacts in Segment 10 are complete for specific reasons outlined above and do not require additional investigation or remediation.

4.11.3 In Channel Terrestrial

Surface water and sediments in the channel of the Kalamazoo River are addressed in the *Potential Chronic Effects of Line 6B Residual Oil Report of Findings*, submitted to EGLE on April 25, 2014 (Enbridge, 2014a) and the *Addendum to the Potential Chronic Effects of Line 6B Residual Oil Report of Findings*, submitted to EGLE on October 30, 2015 (Enbridge, 2015b). Based on these reports no apparent terrestrial risks exist with regard to exposure to in channel surface water or sediments. Furthermore, studies completed by Federal and State of Michigan Health Departments have not identified any risk related to a terrestrial in channel pathway. *Section 4.11.1* of this NFA Report addresses terrestrial impacts related to overbank soil and concludes no further action is warranted.

Conclusion: Remedial actions regarding Segment 10 In Channel terrestrial evaluation is addressed through the *Potential Chronic Effects of Line 6B Residual Oil Report of Findings* (Enbridge, 2014a), the *Addendum to the Potential Chronic Effects of Line 6B Residual Oil Report of Findings* (Enbridge 2015b), and the Terrestrial Ecological Impact analysis in *Section 4.11.1*. Collectively these analyses show no further action is warranted with regard to in-channel terrestrial impacts.

5.0 Summary and Conclusions

This section presents a summary of response and remediation efforts, characterization and confirmation sampling, documentation that remediation is complete, and a request for Part 201 regulatory closure with unrestricted residential use.

5.1 Response and Remediation

The Segment 10 Spill Area has undergone extensive emergency response actions and remedial actions. In 2010, immediately following the Line 6B crude oil release, crude oil was recovered throughout Segment 10. In the Kalamazoo River, pooled oil and impacted vegetation were removed while flushing and scraping removed impacts to surface soil and the shoreline under the SCAT program.

As a result of these activities, the conditions within the Segment 10 Spill Area have been restored to conditions prior to the Line 6B crude oil release, specifically at those locations where soil, sediment, and groundwater impacts related to the Line 6B crude oil release were previously observed. If impacts remain, they are bound to the soils, in the form of very sporadic visible oil or sheen and do not present a risk to human health or the environment and are not actionable. No further response actions are warranted in the Segment 10 Spill Area.

5.2 Characterization and Cleanup Confirmation

The objectives of the Segment 10 Spill Area characterization and confirmation efforts were to evaluate the success of response actions immediately following the Line 6B crude oil release in 2010 and the subsequent remedial excavations in 2011. These activities characterized the nature and extent of remaining impacts to soil, sediment, and groundwater associated with the Line 6B crude oil release; confirmed the effectiveness of the response activities; identified and evaluated potential migration pathways; assessed potential human health and terrestrial risks; evaluated potential aesthetic concerns; and built upon the principles established in the CSM to evaluate and ultimately demonstrate that current conditions in the Segment 10 Spill Area are suitable for unrestricted residential use.

Following the emergency response activities, a series of separate and distinct characterization efforts were conducted across the Spill Area, including Segment 10. These efforts included SOTF, SORT, and KRRI. Extensive sampling, both for qualitative characterization and laboratory analytical purposes, was conducted as part of these efforts. Collectively, results from these efforts were used to identify overbank areas of impact that required remedial excavation.

Sampling was generally conducted in accordance with the S^{3}TM and the approved *Analytical Sampling Approach at Excavation Sites Memorandum*, submitted to EGLE on December 21, 2011 (Enbridge, 2011). Results from these extensive sampling efforts demonstrated that any remaining chemical artifacts from the Line 6B crude oil release are below applicable Criteria and screening levels, except for a few instances where there is no transport mechanism to allow the chemicals to reach a receptor. Therefore, exposure pathways are not complete.

Contemporaneous with the characterization efforts Enbridge, working closely with EGLE, developed a series of White Papers to broadly evaluate issues of naturally occurring background metals in soil and groundwater (Metals White Paper), risk of groundwater impact from Line 6B crude oil (Groundwater White Paper), NAPL mobility (NAPL White Paper), and urban PNAs (Urban PAH White Paper). During 2016 and 2017, the Urban PAH White Paper was supplemented with forensics analysis that Enbridge and EGLE jointly developed over a series of meetings with recognized forensic chemistry experts. These thoroughly researched efforts provide an in-depth assessment of the nature, extent, and source of regional impacts, and the potential for Line 6B crude oil to contribute to soil, sediment, and groundwater impact. As a result of these efforts, EGLE and Enbridge developed the Forensics Process. The Forensics Process consists of five steps which sequentially focuses evaluation of PNA results exceeding Criteria to those samples that reflect potential impact from Line 6B crude oil.

While the sampling documented successful remedial efforts, EGLE expressed concerns on several issues, including historically noted visual surficial observations of oil/sheen, UV fluorescence (both as trace fluorescence and as UV fluorescence), additional PNA and VOC exceedance verification, adequacy of excavation delineation, and ERLs. In response to these concerns, Enbridge conducted an extensive data gap assessment sampling program, including soil samples and groundwater samples for PNAs and/or VOCs, a few of which reported exceedances of Criteria. However, in each instance, supplemental sampling showed that either a pathway was not complete (in the instance of GSIPC or DWPC exceedances) or forensics analysis showed the sample results are not attributable to Line 6B crude oil. In either case, the results provide further evidence that any residual impacts attributable to Line 6B crude oil are of no risk to human health and the environment.

A comprehensive and thorough review of field data records collected over the course of the characterization and confirmation efforts identified a number of locations within the Segment 10 Spill Area where potential aesthetic observations may have remained in the subsurface, either as

visible oil, sheen, or odor associated with soil or groundwater. However, aesthetic site inspections in May 2018 found no aesthetic observations. Further, when evaluated holistically, the lines of evidence demonstrate that these potential observations are isolated and discontinuous and are not actionable aesthetic concerns.

The characterization and confirmation efforts provide a robust data set to demonstrate that the response and remediation efforts have successfully restored the soil, sediment, surface water, and groundwater to conditions prior to the Line 6B crude oil release. No further characterization or response actions are warranted in the Segment 10 Spill Area.

5.3 Remediation Complete

Impacts in the Segment 10 Spill Area that resulted from the Line 6B crude oil release have been successfully addressed by the response and remedial actions described in this NFA Report. Each exposure pathway represented by the Criteria has been evaluated through characterization and confirmation sampling. Terrestrial and aquatic ecological impacts were also evaluated using U.S. EPA screening levels. While a number of exceedances of the screening levels were noted, further evaluation demonstrated that there were no significant impacts to ecological receptors attributable to Line 6B crude oil. Results from these efforts demonstrate that post-response/remediation conditions are consistent with conditions in this area of the Kalamazoo River flood plain where industrial development dates to over 100 years and that the Segment 10 Spill Area is suitable for unrestricted residential use. Remediation is therefore complete.

5.4 Closure Request

This NFA Report for Segment 10 demonstrates that Enbridge's successful response and remediation efforts performed within the Segment 10 Spill Area satisfy the requirements of Part 201. Based on this documentation and pursuant to Section 20114d(3)(a) of Part 201, Enbridge respectfully requests EGLE provide approval of this NFA Report for Segment 10 as an "unrestricted residential closure".

Attachment A contains the *Request for DEQ Review of No Further Action (NFA) Report* (Form EQP4030) as well as the required notarized affidavits and certificate of insurance.

Enbridge will retain all relevant records for a minimum of 10 years after approval of this NFA Report.

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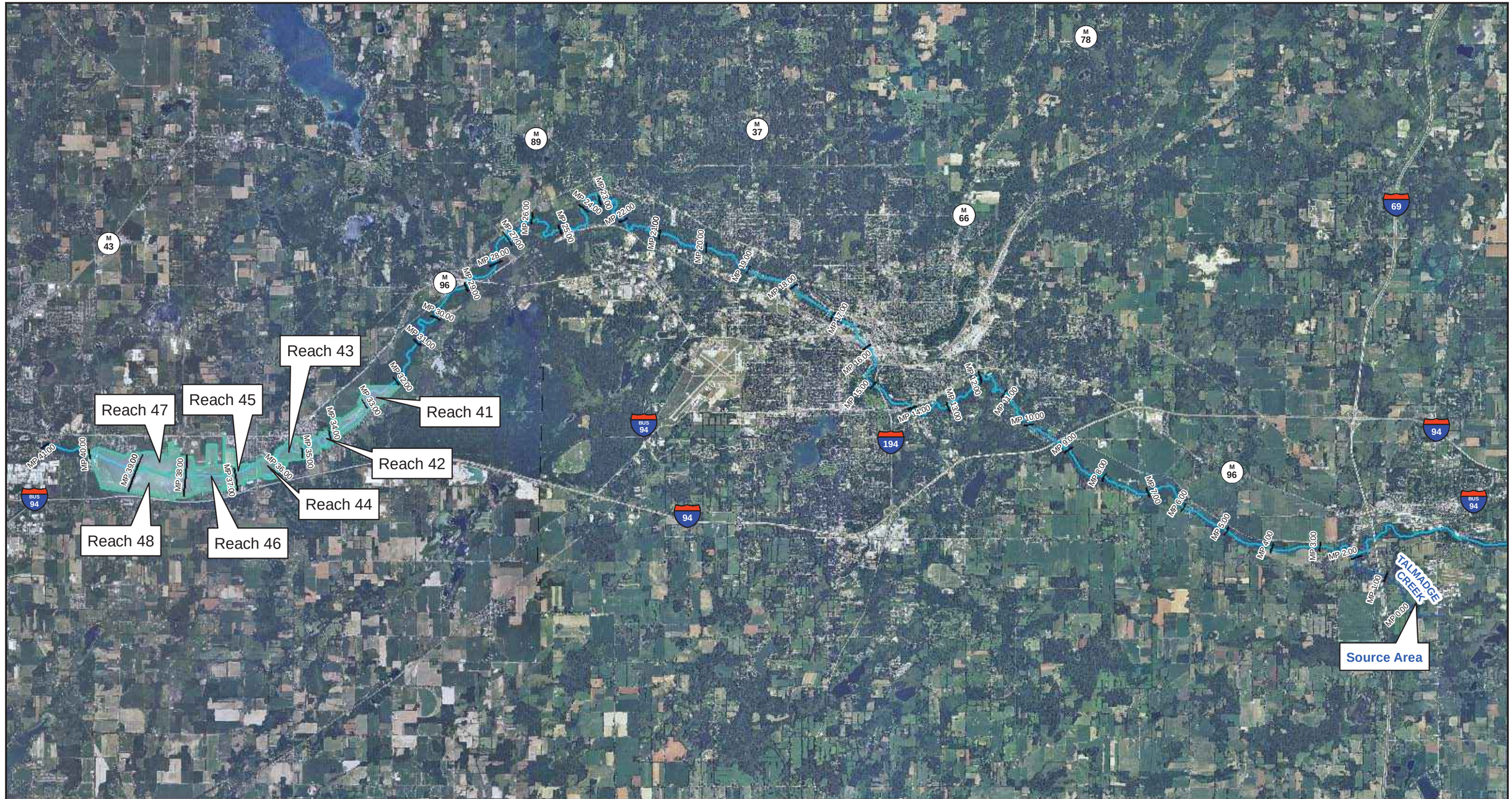
Figures



ENBRIDGE

Drawn:	MK	3/18/2019
Approved:	RP	3/18/2019
Project #:	60595643	

Map Location

Legend

- Reach 41 through Reach 48
- Kalamazoo River
- Talmadge Creek
- Mile Grid Segments

N

0 5,000 10,000 20,000

Scale in Feet

FIGURE 1
SEGMENT 10
SITE LOCATION
SHEET 1 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_01_Segment_10_Site_Location_Sheet1.mxd

Aerial Photography Date: 2010

Reach 41
Reach 42
Reach 43
Reach 44
Reach 45
Reach 46
Reach 47
Reach 48
MP 31.50
MP 31.75
MP 32.00
MP 32.25
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MP 32.75
MP 33.00
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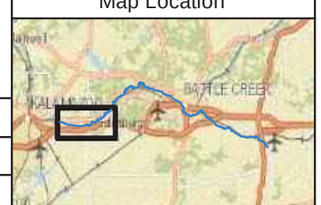
ENBRIDGE

Drawn:	MK	3/18/2019
Approved:	RP	3/18/2019
Project #:	60595643	

Map Location



Legend

- Reach 41 through Reach 48
- Kalamazoo River
- Talmadge Creek
- Quarter Mile Grid Segments

N

0 1,250 2,500 5,000

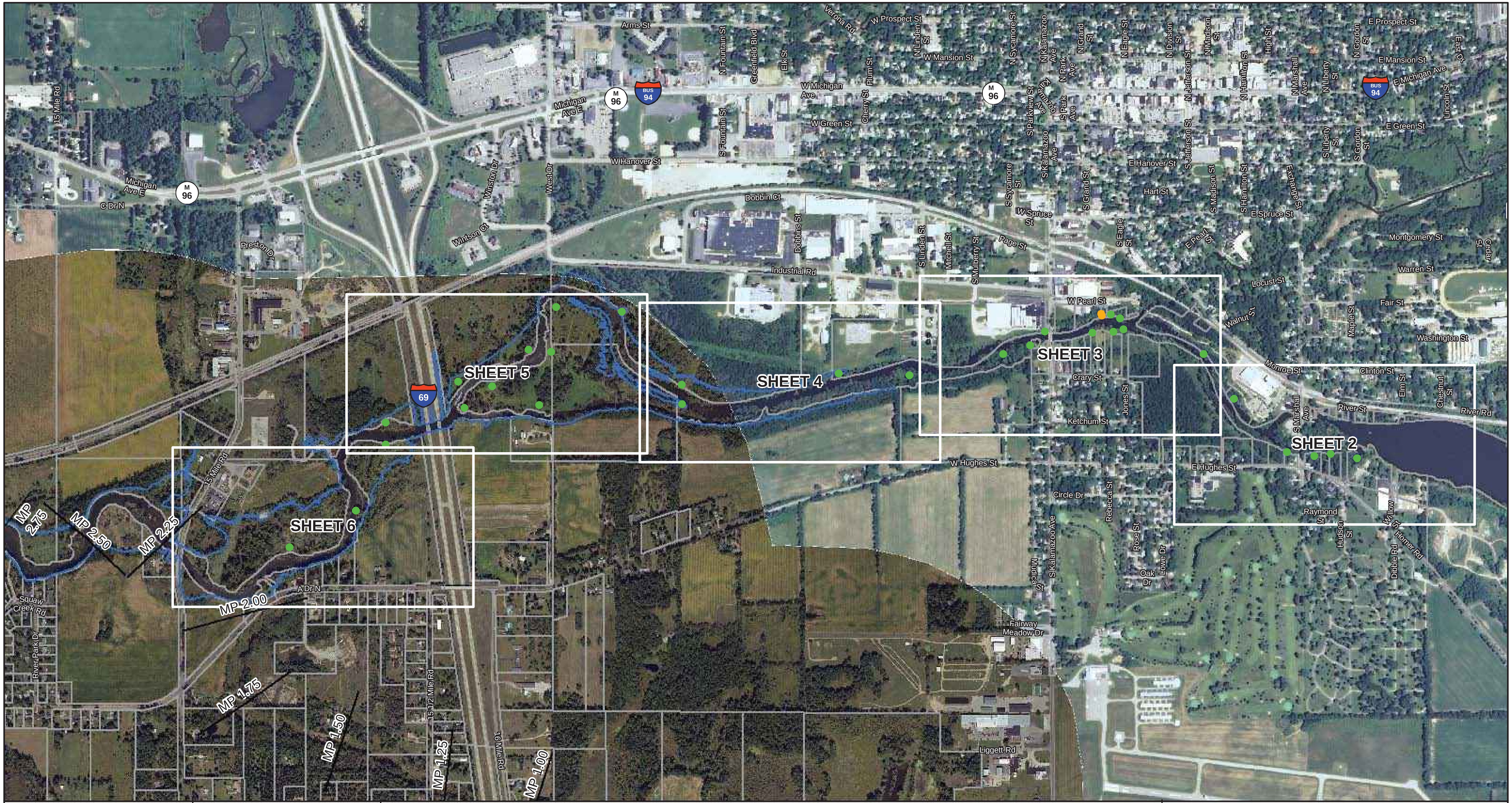
Scale in Feet

FIGURE 1
SEGMENT 10
SITE LOCATION
SHEET 2 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_01_Segment_10_Site_Location_Sheet2.mxd

Aerial Photography Date: 2010



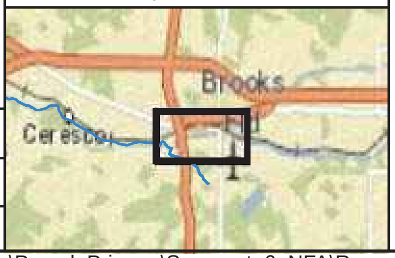
ENBRIDGE

Drawn: MK 3/19/2019

Approved: JB 3/19/2019

Project #: 60595643

Map Location



Legend

Kalamazoo River RI

- Oil
- Visible Sheen
- Fluoresced Oil
- Trace Fluorescence
- No Oil Observed

- Kalamazoo River Flood Inundation Boundary
- Parcel
- Quarter Mile Grid Segments
- SBKR0000R507 Sample Location has Analytical Exceedance(s)

N

0 500 1,000 2,000

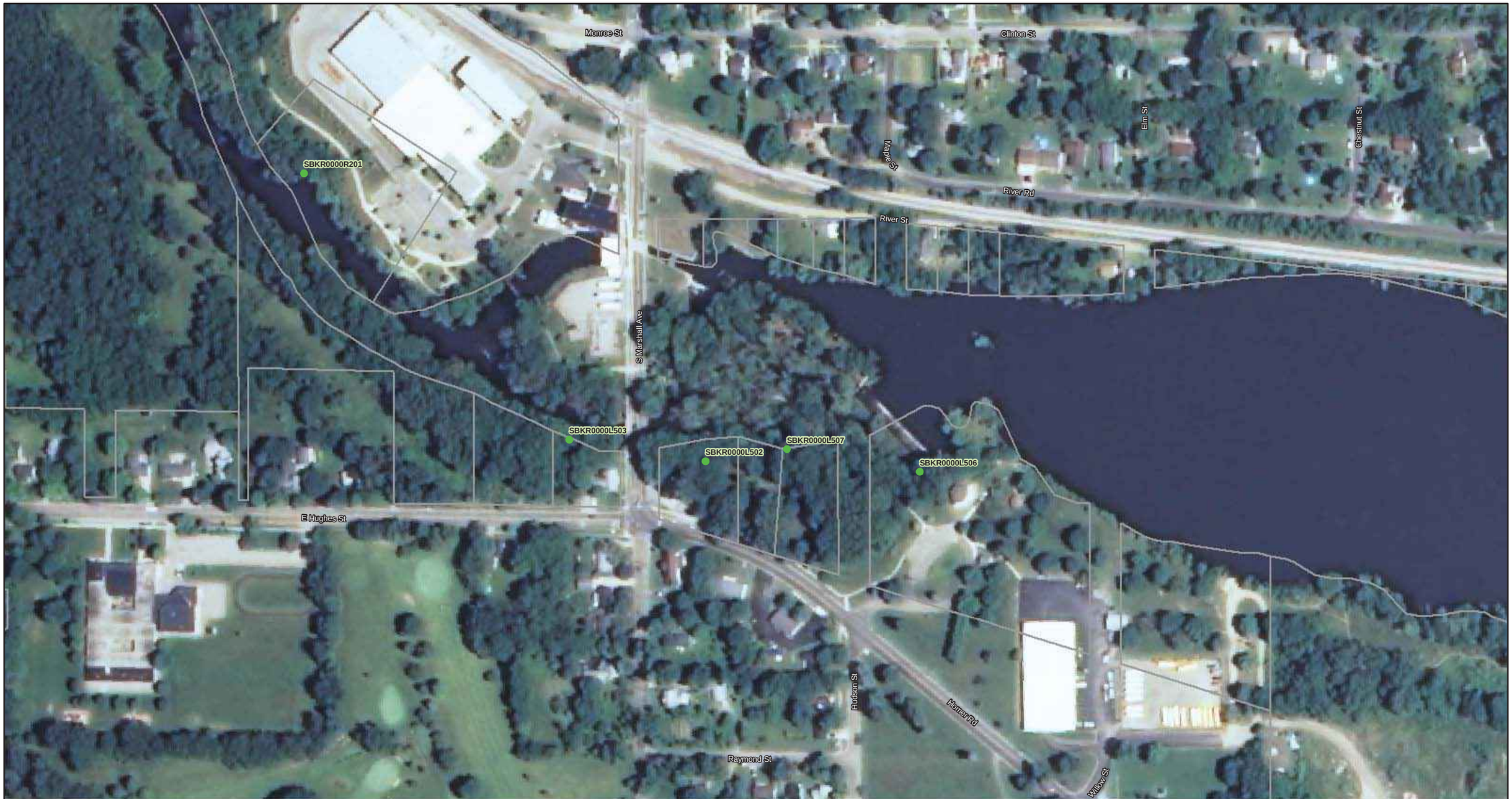
Scale in Feet

FIGURE 2
KALAMAZOO RIVER BACKGROUND
SOIL SAMPLE LOCATIONS
SHEET 1 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_6_NFA\Report\Figure_02_Segment_6_Kalamazoo_River_Background_Soil_Sample_Locations_Sheet1.mxd

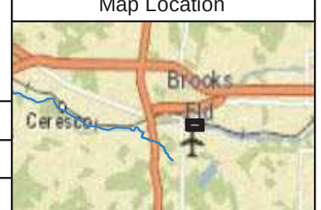
Aerial Photography Date: September 2015 over 2010



ENBRIDGE

Drawn:	MK	3/19/2019
Approved:	JB	3/19/2019
Project #:	60595643	

Map Location



Legend

Kalamazoo River RI

- Oil
- Visible Sheen
- Fluoresced Oil
- Trace Fluorescence
- No Oil Observed

- Kalamazoo River Flood Inundation Boundary
- Parcel
- Quarter Mile Grid Segments

SBKR0000R507 Sample Location has Analytical Exceedance(s)

N

0 100 200 400

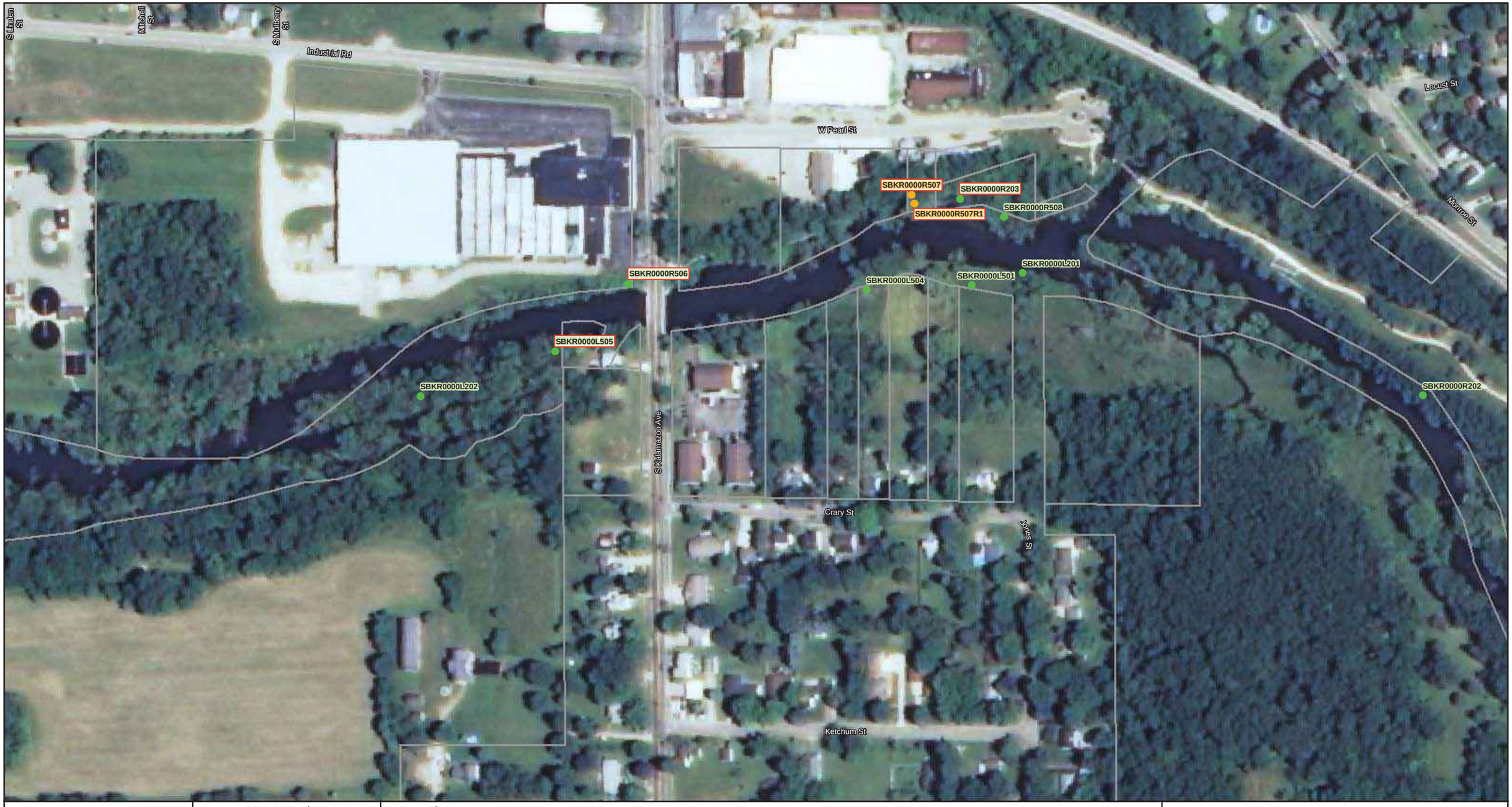
Scale in Feet

FIGURE 2
KALAMAZOO RIVER BACKGROUND
SOIL SAMPLE LOCATIONS
SHEET 2 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_6_NFA\Report\Figure_02_Segment_6_Kalamazoo_River_Background_Soil_Sample_Locations_Sheet2-6.mxd

Aerial Photography Date: September 2015 over 2010



ENBRIDGE

Drawn:	MK	3/19/2019
Approved:	JB	3/19/2019
Project #:	60595643	

Map Location

Legend

Kalamazoo River RI

- Oil
- Visible Sheen
- Fluoresced Oil
- Trace Fluorescence
- No Oil Observed

Kalamazoo River Flood Inundation Boundary

Parcel

Quarter Mile Grid Segments

SBKR0000R507 Sample Location has Analytical Exceedance(s)

N

0 100 200 400

Scale in Feet

FIGURE 2
KALAMAZOO RIVER BACKGROUND
SOIL SAMPLE LOCATIONS
SHEET 3 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

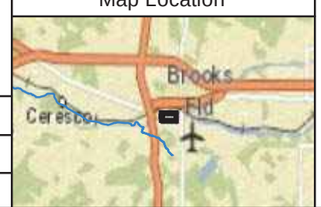
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_6_NFA\Report\Figure_02_Segment_6_Kalamazoo_River_Background_Soil_Sample_Locations_Sheet2-6.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	MK	3/19/2019
Approved:	JB	3/19/2019
Project #:	60595643	

Map Location



Legend

Kalamazoo River RI

- Oil
- Visible Sheen
- Fluoresced Oil
- Trace Fluorescence
- No Oil Observed

Kalamazoo River Flood Inundation Boundary

Parcel

Quarter Mile Grid Segments

SBKR0000R507 Sample Location has Analytical Exceedance(s)

N

0 100 200 400

Scale in Feet

FIGURE 2
KALAMAZOO RIVER BACKGROUND
SOIL SAMPLE LOCATIONS
SHEET 4 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

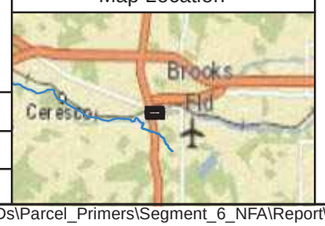
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_6_NFA\Report\Figure_02_Segment_6_Kalamazoo_River_Background_Soil_Sample_Locations_Sheet2-6.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	MK	3/19/2019
Approved:	JB	3/19/2019
Project #:	60595643	

Map Location



Legend

Kalamazoo River RI

- Oil
- Visible Sheen
- Fluoresced Oil
- Trace Fluorescence
- No Oil Observed

- Kalamazoo River Flood Inundation Boundary
- Parcel
- Quarter Mile Grid Segments

SBKR0000R507 Sample Location has Analytical Exceedance(s)

N

0 100 200 400

Scale in Feet

FIGURE 2
KALAMAZOO RIVER BACKGROUND
SOIL SAMPLE LOCATIONS
SHEET 5 OF 6

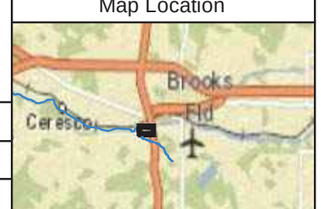
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_6_NFA\Report\Figure_02_Segment_6_Kalamazoo_River_Background_Soil_Sample_Locations_Sheet2-6.mxd

Aerial Photography Date: September 2015 over 2010

Drawn:	MK	3/19/2019
Approved:	JB	3/19/2019
Project #:	60595643	

Map Location



Legend

Kalamazoo River RI

- Oil
- Visible Sheen
- Fluoresced Oil
- Trace Fluorescence
- No Oil Observed

- Kalamazoo River Flood Inundation Boundary
- Parcel
- Quarter Mile Grid Segments
- SBKR0000R507 — Sample Location has Analytical Exceedance(s)

N

0 100 200 400

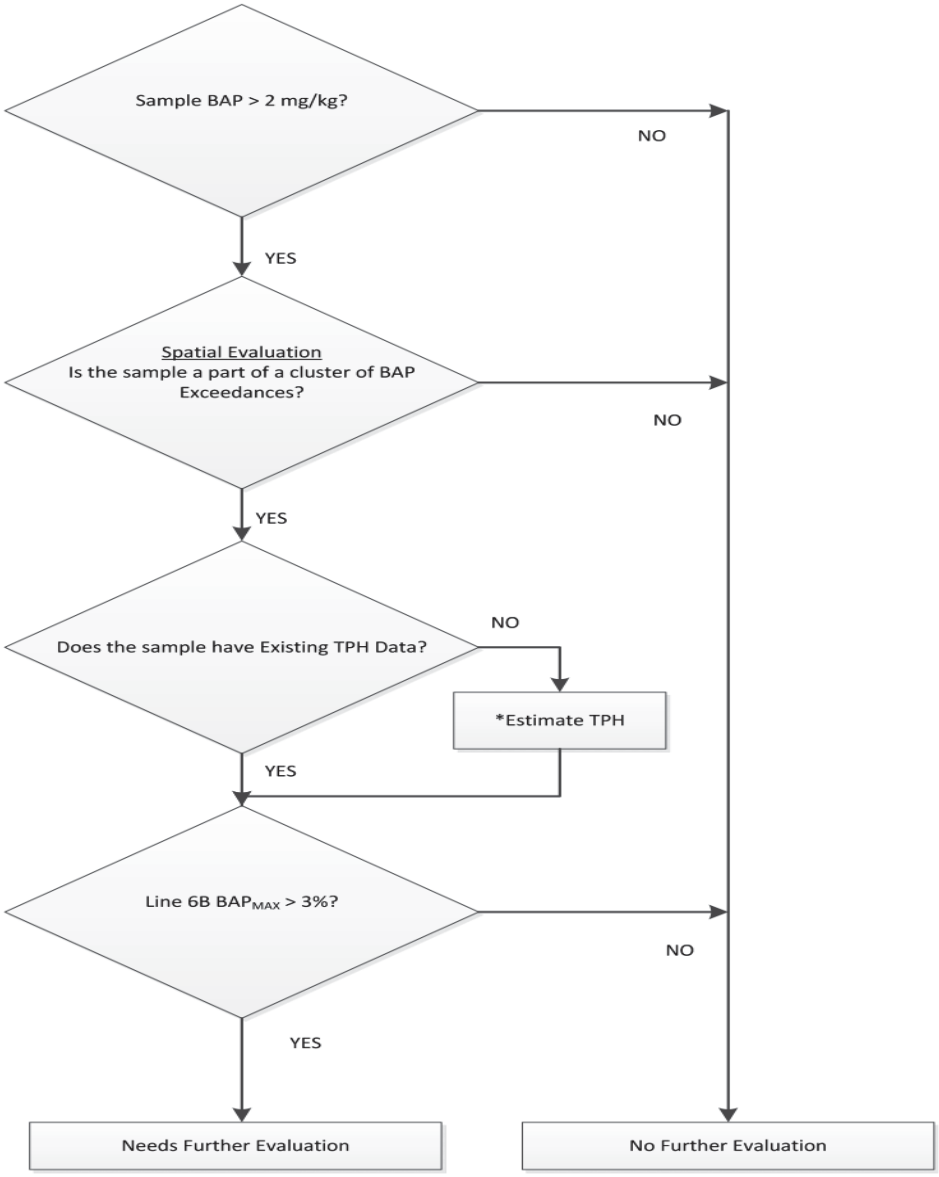
Scale in Feet

FIGURE 2
KALAMAZOO RIVER BACKGROUND
SOIL SAMPLE LOCATIONS
SHEET 6 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_6_NFA\Report\Figure_02_Segment_6_Kalamazoo_River_Background_Soil_Sample_Locations_Sheet2-6.mxd

Aerial Photography Date: September 2015 over 2010

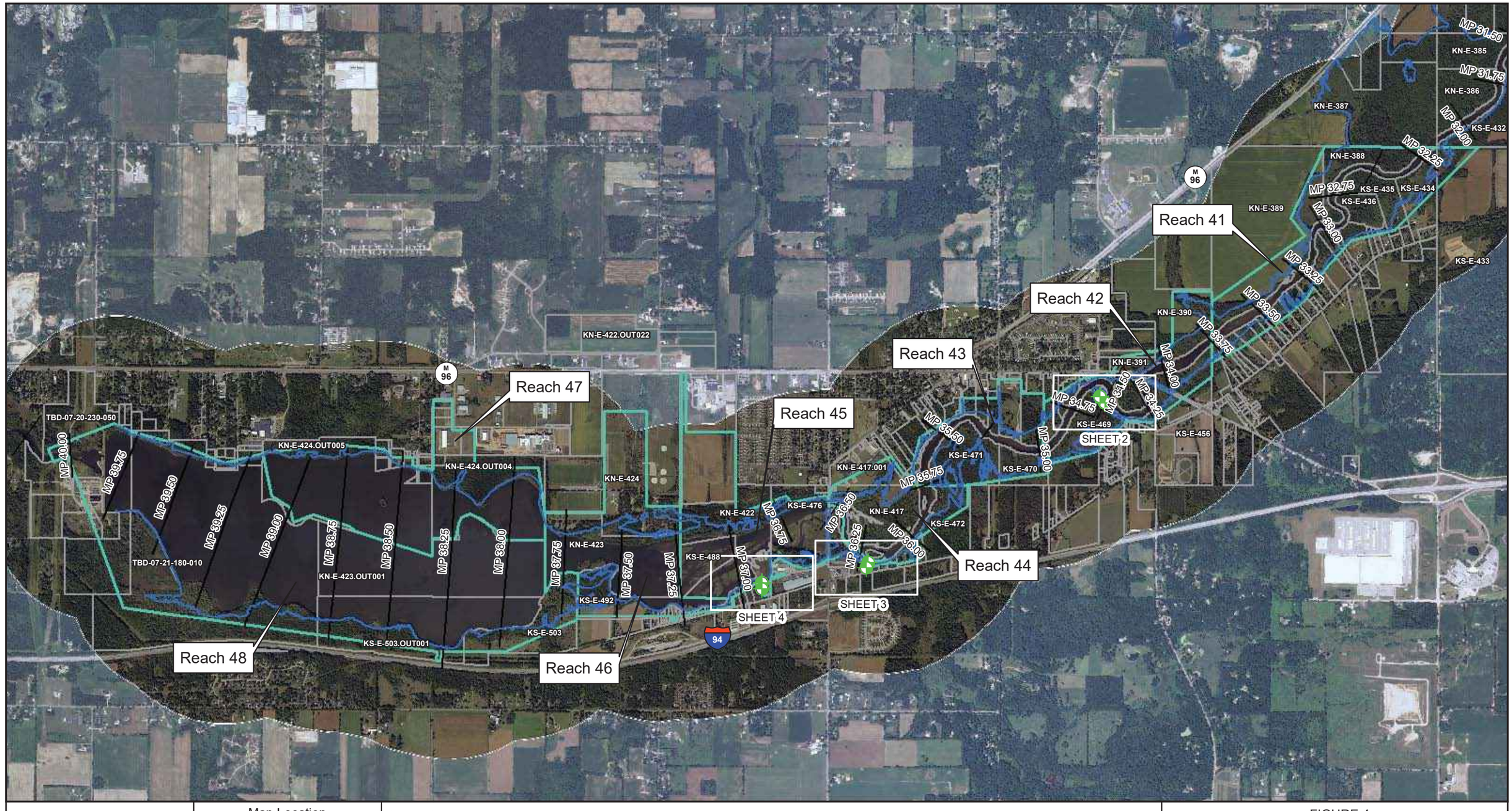


Needs Further Evaluation

- Evaluation of ecological sensitivity
- Nature and extent of non-Line 6B exceedances
- Assessment of plausible exposure scenarios
- Examination of GC/MS Chromatograms
- Potential resampling for forensic analysis
- Application of mixing model

*Reprocess existing ALS GC/MS raw data to calculate an estimated TPH value.

ENBRIDGE		FIGURE 3 FORENSICS PROCESS DIAGRAM
Drawn: CA		ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY, LIMITED PARTNERSHIP
Approved: DD		
Project#: 60595643		



ENBRIDGE

Drawn:	MK	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

- Abandoned Monitoring Well
- Reach 41 through Reach 48
- Parcel
- Kalamazoo River Flood Inundation Boundary
- Quarter Mile Grid Segments

N

0 1,100 2,200 4,400

Scale in Feet

FIGURE 4
SEGMENT 10
MONITORING WELL ABANDONMENT
SHEET 1 OF 4

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_04_Segment_10_Monitoring_Well_Abandonment_Sheet1.mxd

Aerial Photography Date: September 2015 over 2010

KN-E-399
KN-E-397
KN-E-396
KN-E-394.OUT001
KN-E-395
KN-E-393
KS-E-456
KN-E-401
KN-E-402
KS-E-468
KS-E-467
KS-E-466
KS-E-465
KS-E-464
KS-E-463
MWKR3460L01
MWKR3460L02
MP 34.50
MWKR3450L03
MWKR3450L01
MWKR3450L02
MWKR3450L04
KN-E-394
MP 34.25
KN-E-402.001
MP 34.75
KS-E-469
KN-E-403
ROW-CLIMAX DR
KS-E-462
KS-E-457
KS-E-461
KS-E-460
KS-E-459
KS-E-458
TBD-08-19-256-020

ENBRIDGE

Drawn:	MK	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

- Abandoned Monitoring Well
- Reach 41 through Reach 48
- Parcel
- Kalamazoo River Flood Inundation Boundary
- Quarter Mile Grid Segments

N

0 75 150 300

Scale in Feet

FIGURE 4
SEGMENT 10
MONITORING WELL ABANDONMENT
SHEET 2 OF 4

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_04_Segment_10_Monitoring_Well_Abandonment_Sheet2-4.mxd

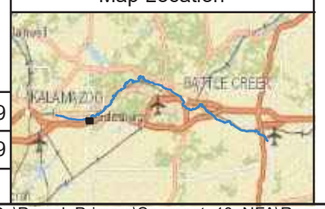
Aerial Photography Date: September 2015 over 2010

KN-E-417
KS-E-476
KS-E-473
MP 3625
KS-E-474
TBD-07-24-356-040
KS-E-480
MWKR3620L02
KS-E-481
MWKR3620L01
KS-E-475
KS-E-479
KS-E-477
MWKR3620L03
TBD-07-24-455-050
KS-E-478
TBD-07-24-380-096
94

ENBRIDGE

Drawn:	MK	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

- Abandoned Monitoring Well
- Reach 41 through Reach 48
- Parcel
- Kalamazoo River Flood Inundation Boundary
- Quarter Mile Grid Segments

N

0 75 150 300

Scale in Feet

FIGURE 4
SEGMENT 10
MONITORING WELL ABANDONMENT
SHEET 3 OF 4

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_04_Segment_10_Monitoring_Well_Abandonment_Sheet2-4.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	MK	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

- Abandoned Monitoring Well
- Reach 41 through Reach 48
- Parcel
- Kalamazoo River Flood Inundation Boundary
- Quarter Mile Grid Segments

N

0 75 150 300

Scale in Feet

FIGURE 4
SEGMENT 10
MONITORING WELL ABANDONMENT
SHEET 4 OF 4

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_04_Segment_10_Monitoring_Well_Abandonment_Sheet2-4.mxd

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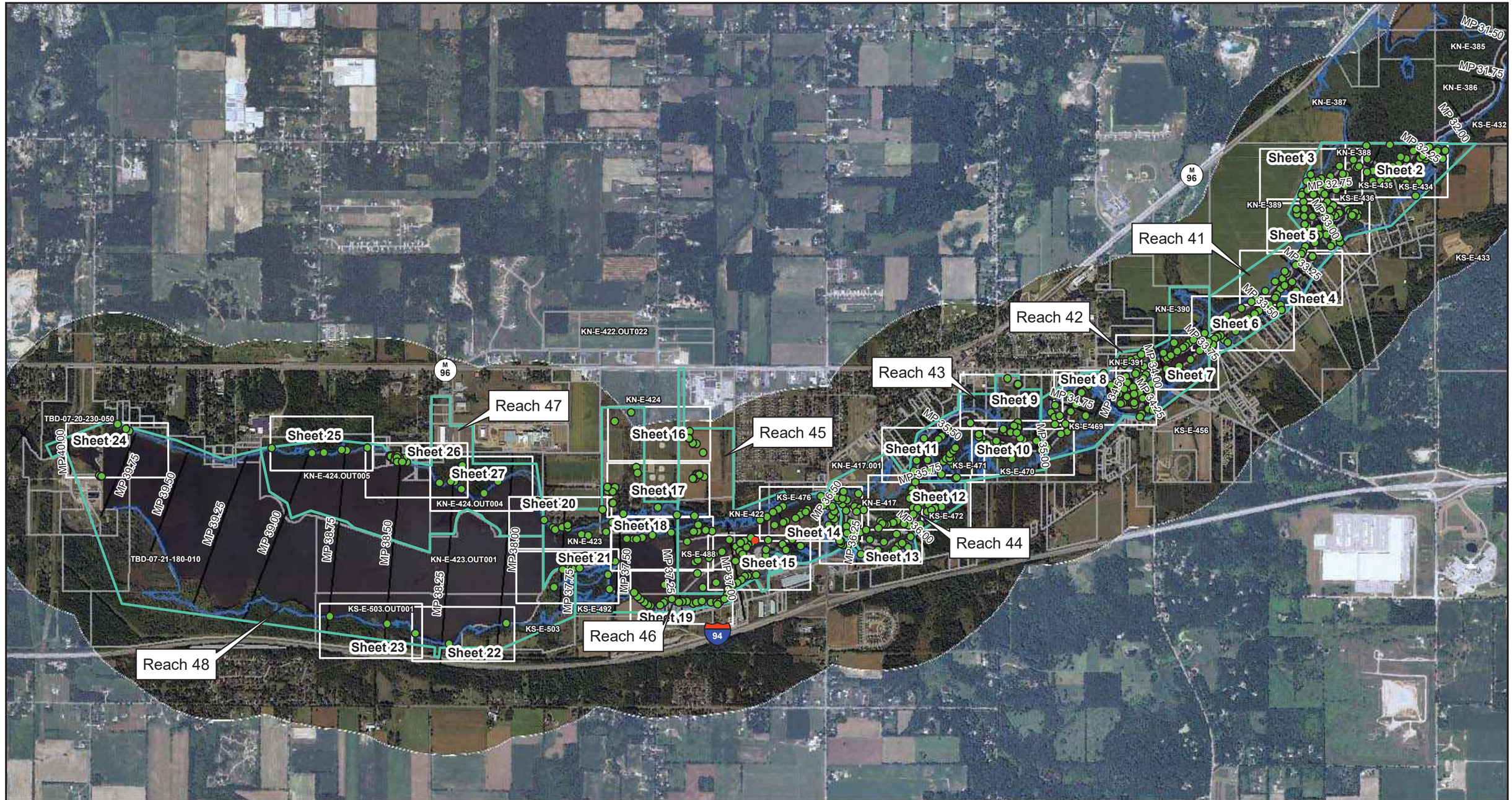
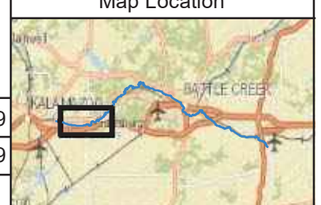


ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 1,100 2,200 4,400

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 1 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

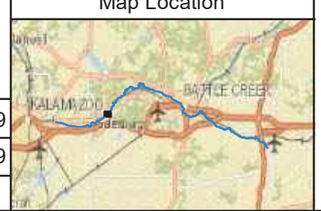
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 2 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

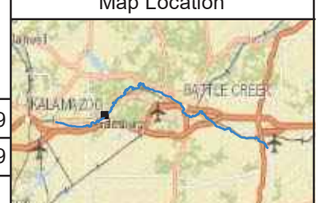
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 3 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

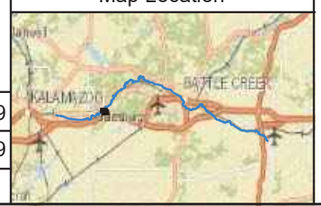
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 4 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

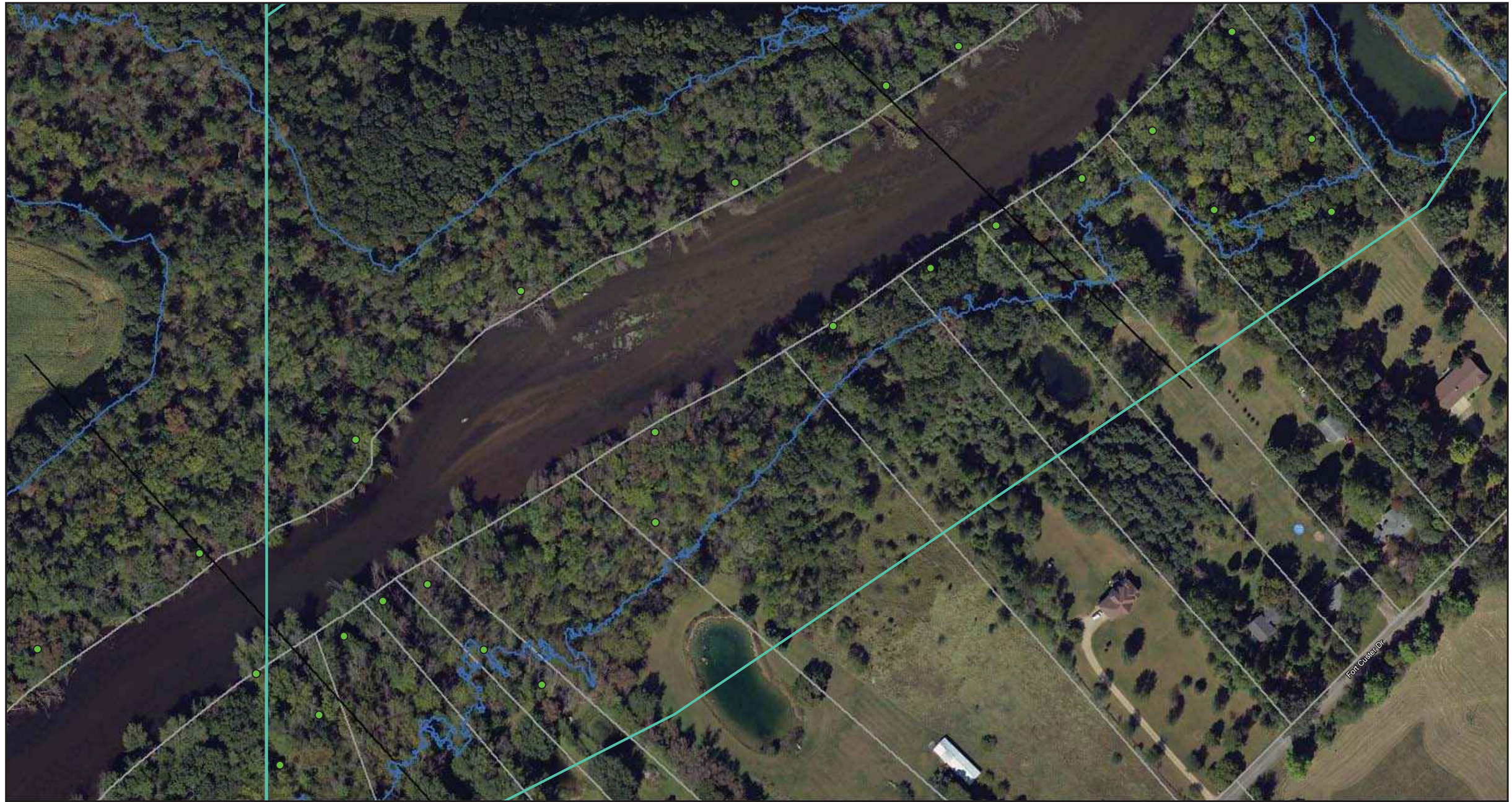
Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 5 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010



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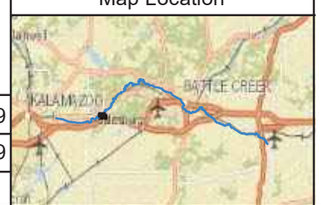
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 6 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 7 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 8 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

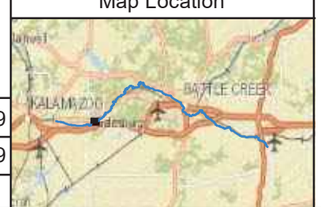
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 9 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

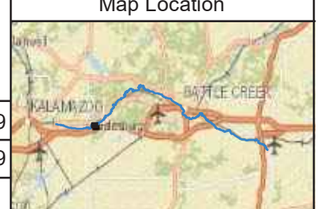
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 10 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

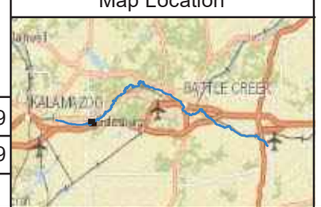
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 11 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

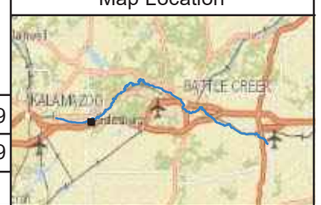
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 12 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 13 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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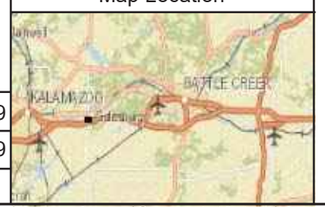
Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 14 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 15 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

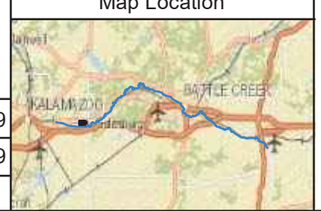
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 16 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

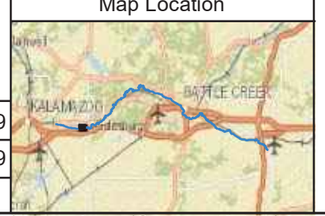
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_05_Segment_10_Forensics_Step_1_Locations_Sheets2-27.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 17 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 18 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 19 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 20 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 21 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 22 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 23 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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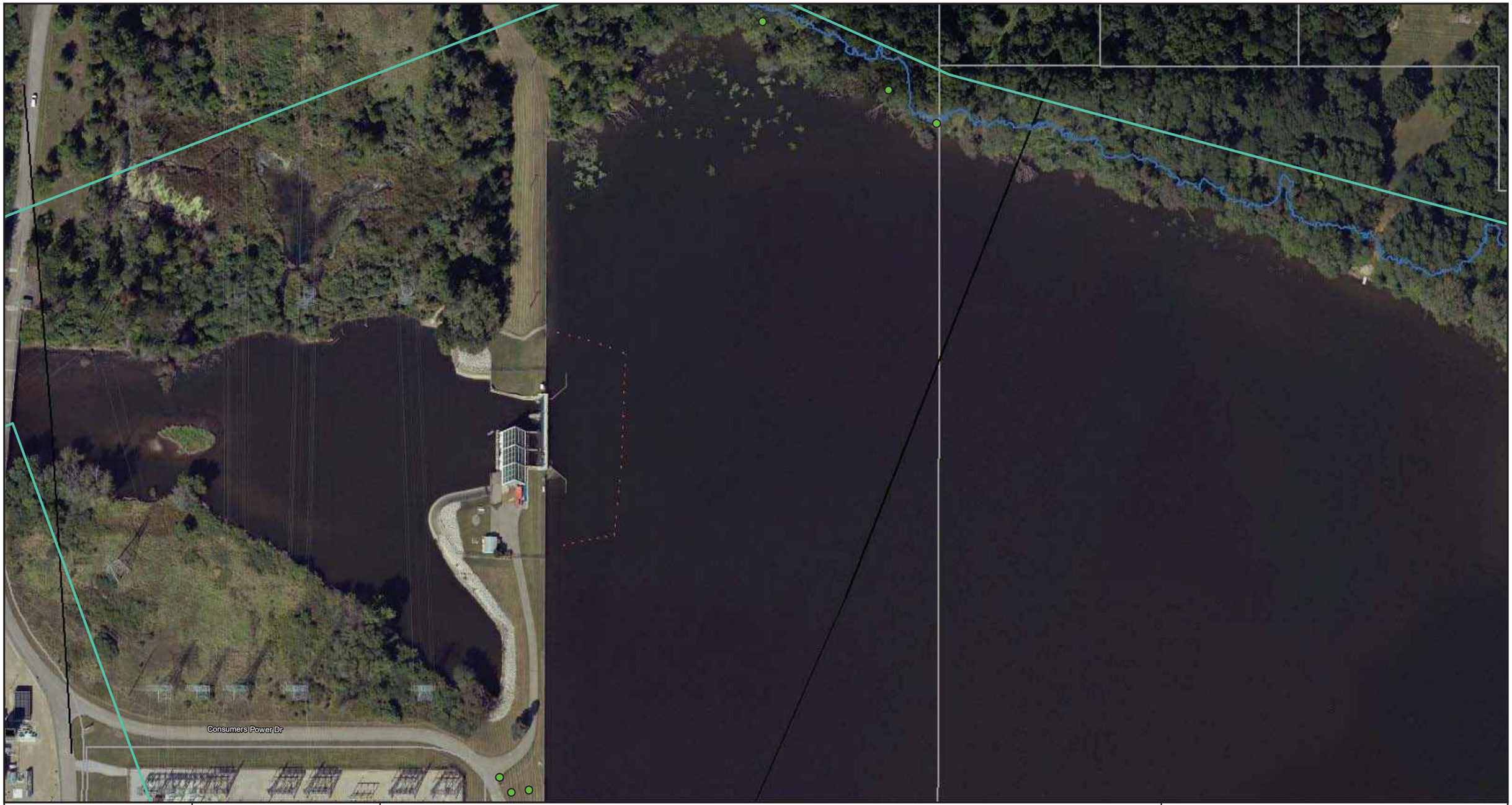
Aerial Photography Date: September 2015 over 2010



ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 24 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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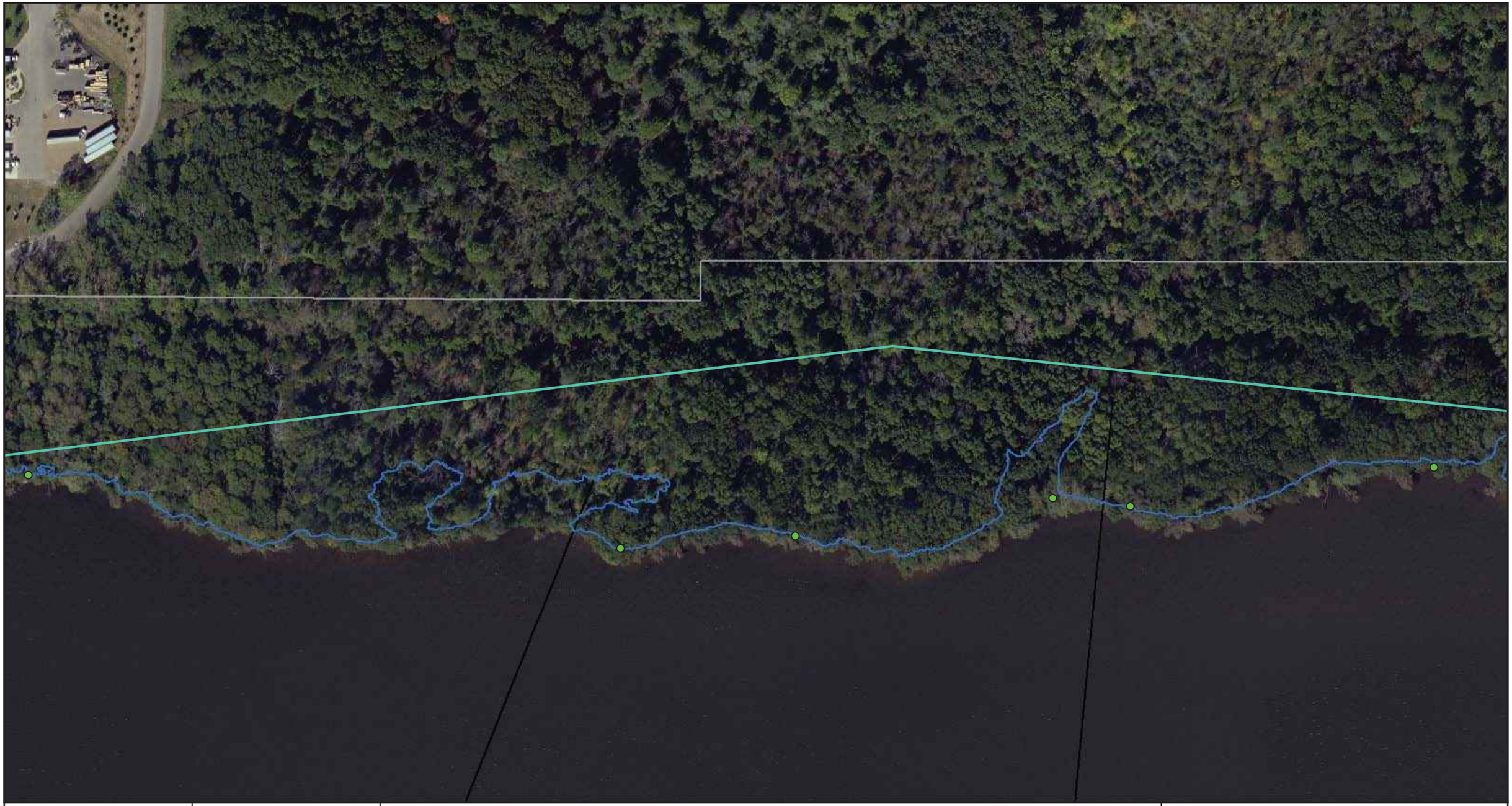
Aerial Photography Date: September 2015 over 2010



ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 25 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
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Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 26 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
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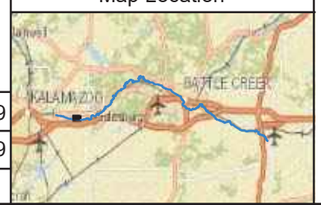
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 75 150 300

Scale in Feet

FIGURE 5
SEGMENT 10
FORENSICS PROCESS
STEP 1 SAMPLE LOCATIONS
SHEET 27 OF 27

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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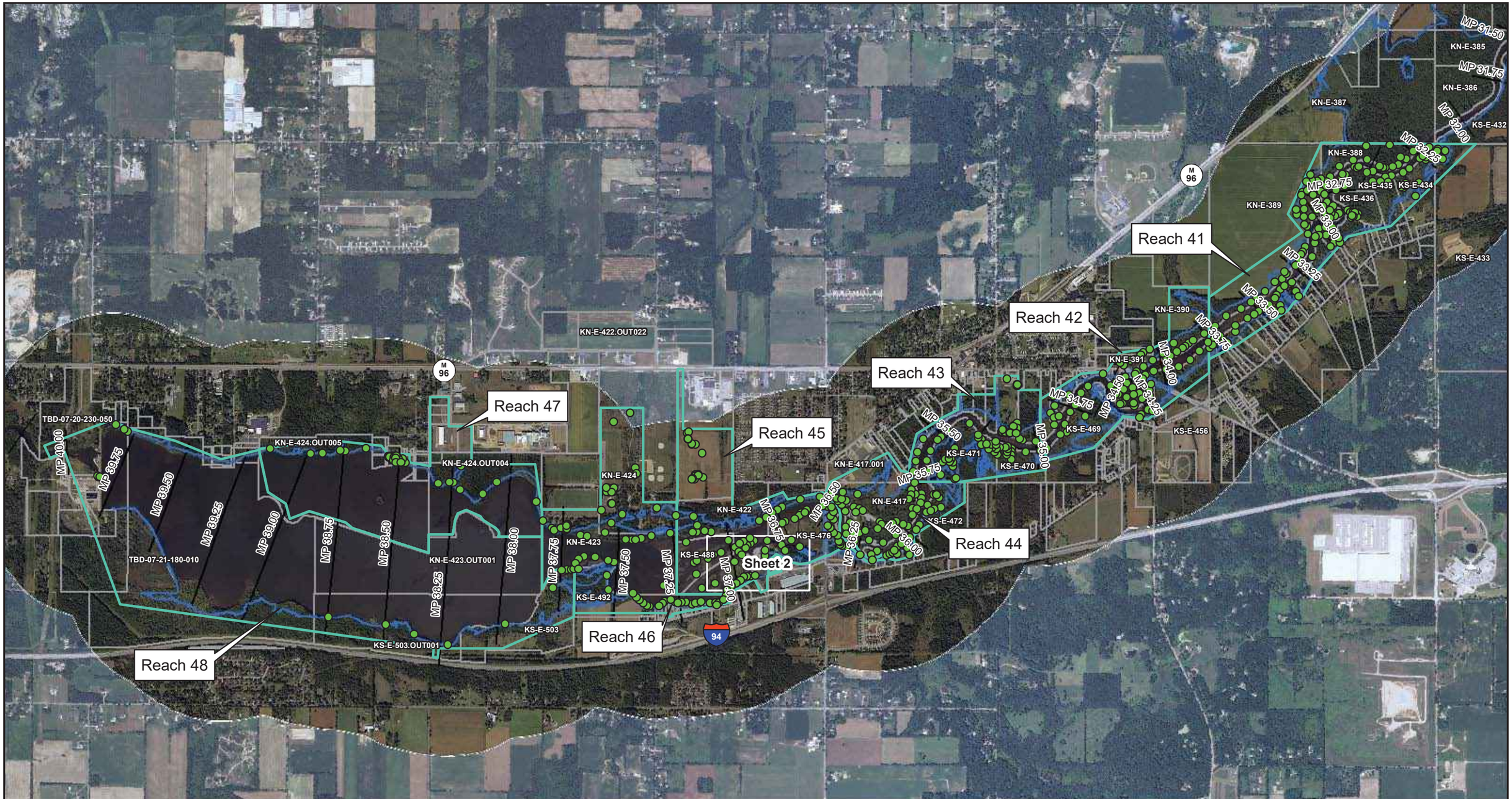
Aerial Photography Date: September 2015 over 2010



ENBRIDGE

Drawn:	DP	12/10/2019
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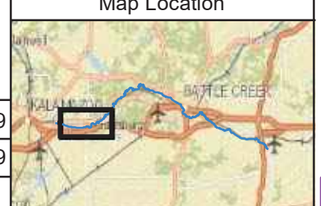
Project #:	60595643	

Map Location



Legend

Benzo(a)pyrene, mg/kg

- ≤ 2 or Eliminated at Step 2
- > 2

Quarter Mile Grid Segments

Kalamazoo River Flood Inundation Boundary

Reach 41 through Reach 48 Spill Areas

Parcel

SBKR08751504 Designates Sample Eliminated at Step 2

N

0 1,100 2,200 4,400

Scale in Feet

FIGURE 6
SEGMENT 10
FORENSICS PROCESS
STEP 2 SAMPLE LOCATIONS
SHEET 1 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_06_Segment_10_Forensics_Step_2_Locations.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/10/2019
Approved:	CA	12/10/2019
Project #:	60595643	

Map Location

Legend

Benzo(a)pyrene, mg/kg

- ≤ 2 or Eliminated at Step 2
- > 2

- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48 Spill Areas
- Parcel

SBKR0875I504 Designates Sample Eliminated at Step 2

N

0 75 150 300

Scale in Feet

FIGURE 6
SEGMENT 10
FORENSICS PROCESS
STEP 2 SAMPLE LOCATIONS
SHEET 2 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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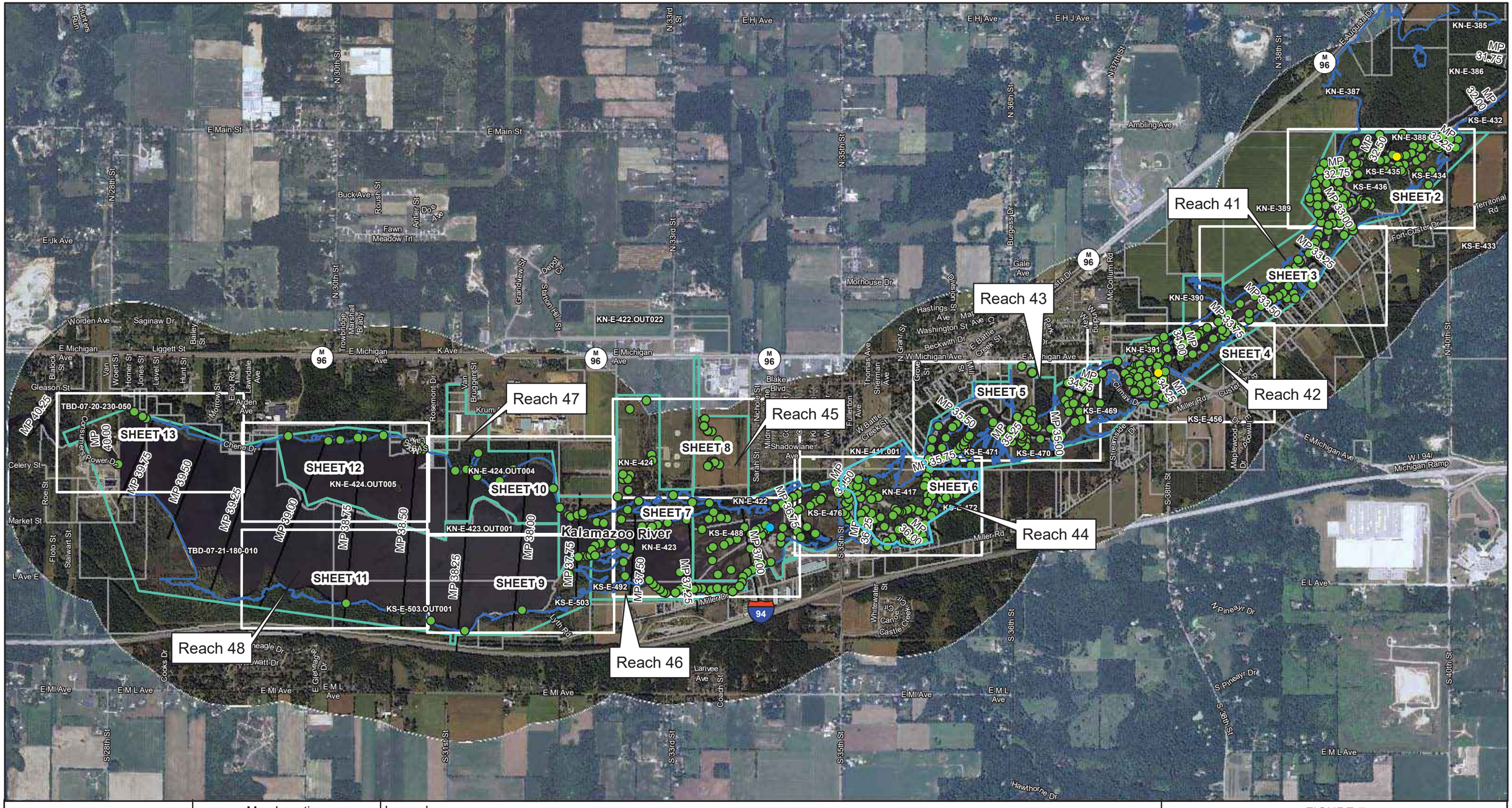
Aerial Photography Date: September 2015 over 2010



ENBRIDGE

Drawn:	DP	12/10/2019
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Project #:	60595643	

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 1 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_07_Segment_10_Terrestrial_Eval_Sheet1.mxd

Aerial Photography Date: September 2015 over 2010

KN-E-387
KS-E-432
KN-E-388
MP 32.25
MP 32.50
Kalamazoo River
KN-E-389
MP 32.75
KS-E-435
KS-E-434
KS-E-433
KS-E-436
MP 33.00
KS-E-437
KS-E-436.OUT001
TBD-08-17-251-061
KS-E-439
KS-E-438
KS-E-440
TBD-08-17-251-050
Fort Custer Dr
TBD-08-17-276-055
N 40th St
Territorial Rd

ENBRIDGE

Drawn:	DP	12/9/2019
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Project #:	60595643	

Map Location

Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 2 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

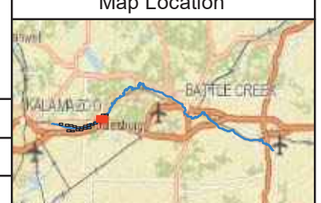
Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_07_Segment_10_Terrestrial_Eval_Sheet2+.mxd

Aerial Photography Date: September 2015 over 2010

ENBRIDGE

Drawn:	DP	12/9/2019
Approved:	CA	12/9/2019
Project #:	60595643	

Map Location



Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 3 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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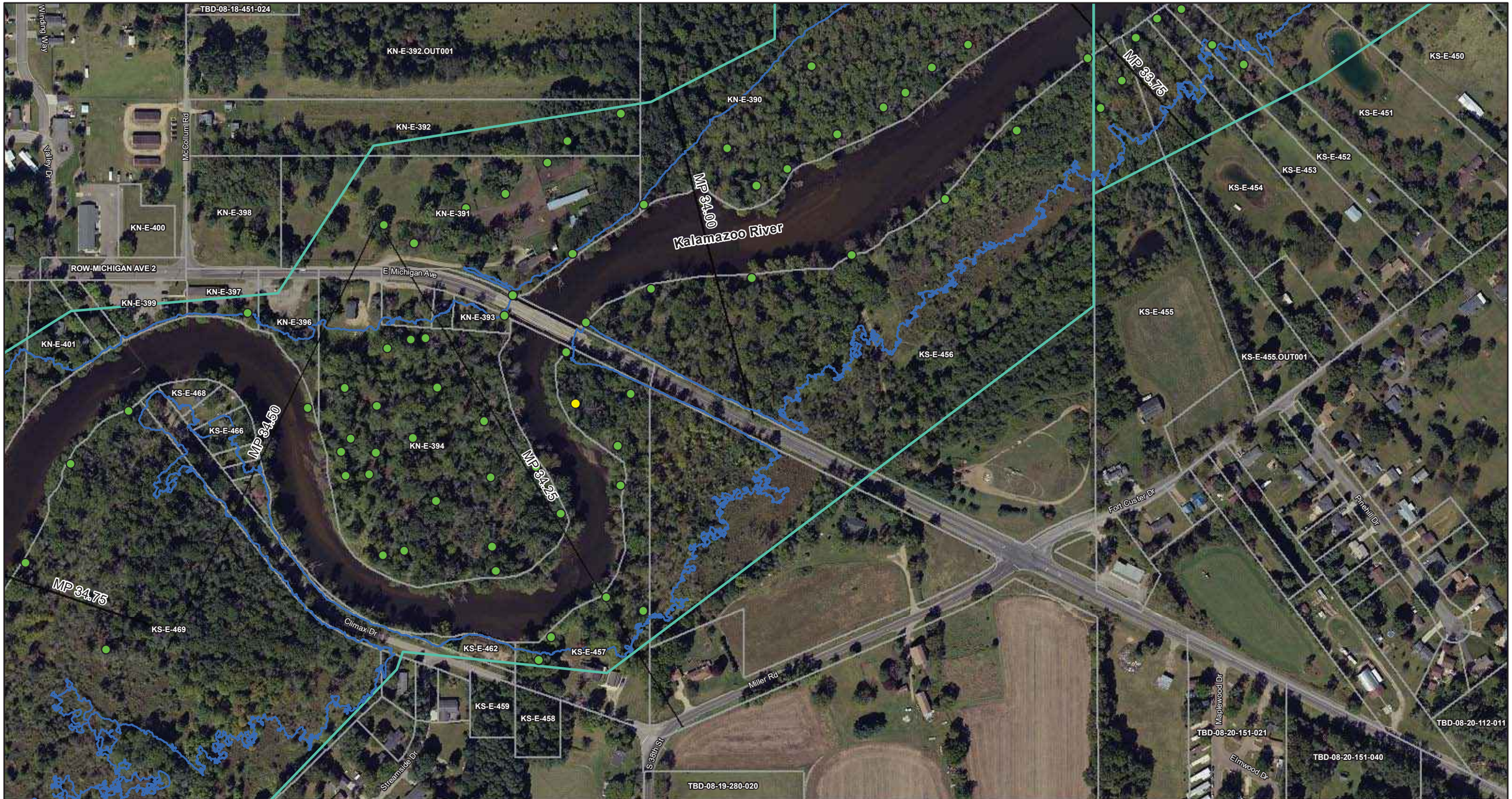
Aerial Photography Date: September 2015 over 2010



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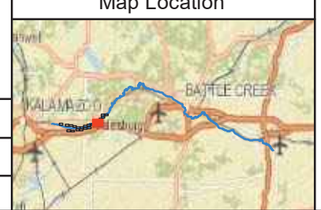
Project #:	60595643	

Map Location



Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 4 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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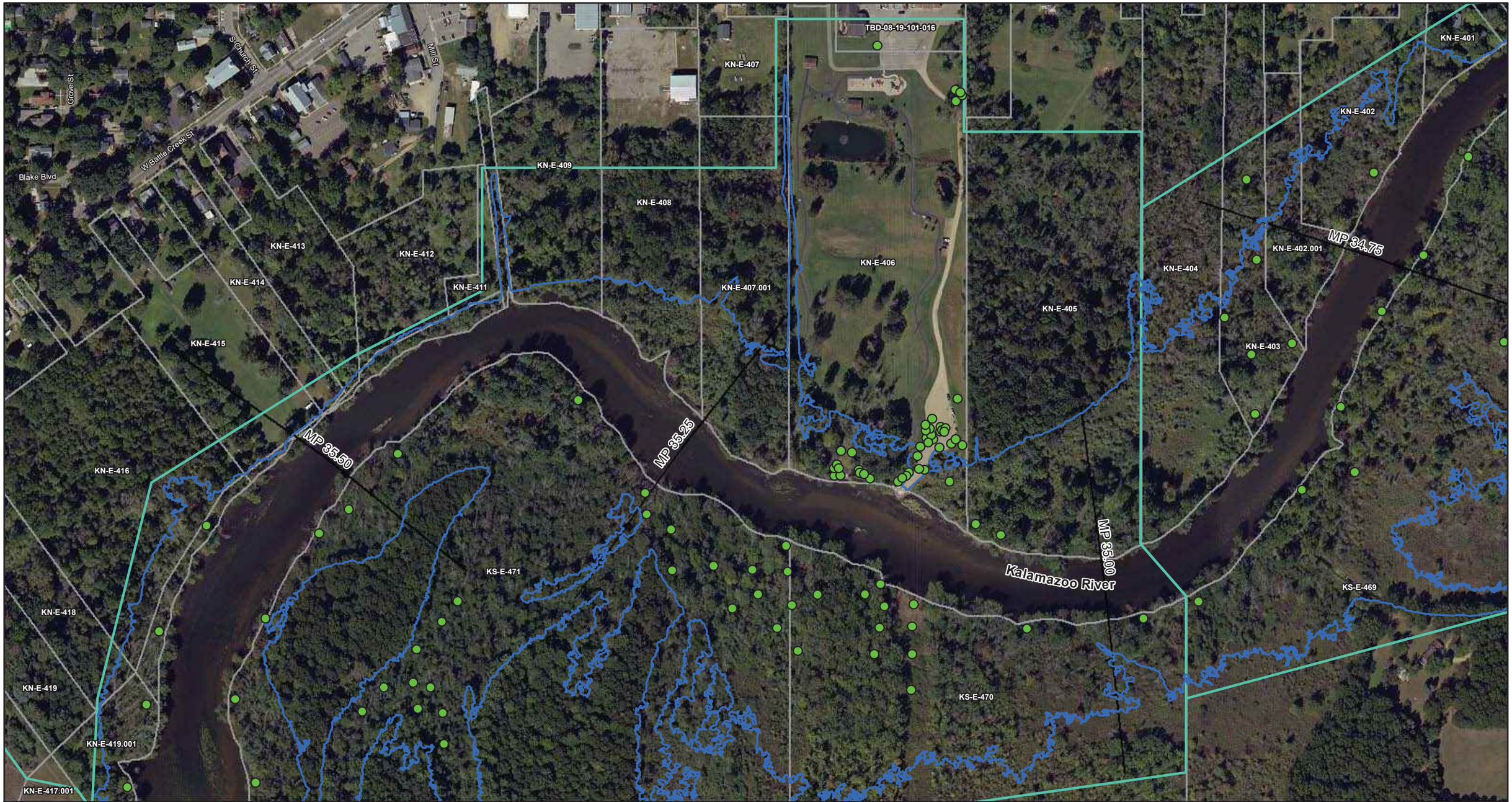

ENBRIDGE

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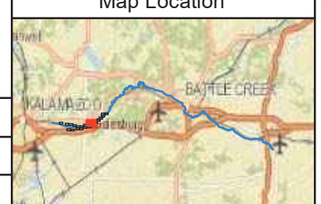
Project #:	60595643	

Map Location



Legend

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- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 5 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

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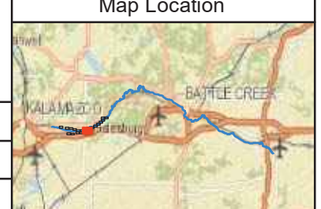
Map Location



Legend

- Does Not Exceed Terrestrial Screening Levels
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- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 6 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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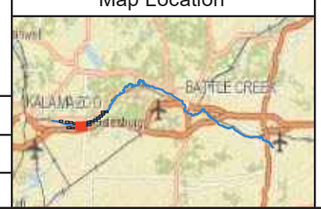
Map Location



Legend

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- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 7 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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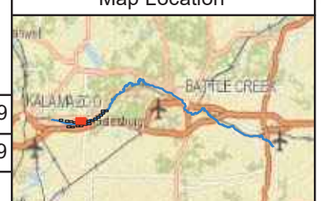

Legend

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- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 8 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

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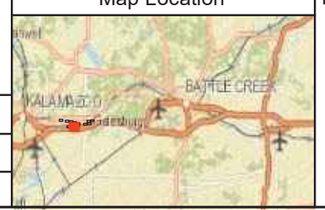
Map Location



Legend

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- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 9 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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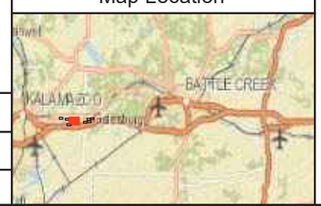
Map Location



Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 10 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\Kalamazoo_River_RI\MXDs\Parcel_Primers\Segment_10_NFA\Report\Figure_07_Segment_10_Terrestrial_Eval_Sheet2+.mxd

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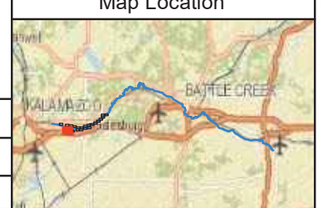
Project #:	60595643	

Map Location



Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 11 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

ENBRIDGE

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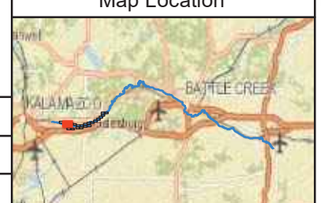

Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 12 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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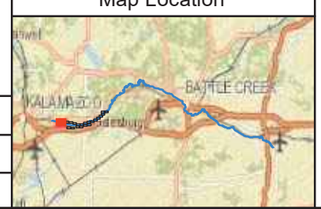
Project #:	60595643	

Map Location



Legend

- Does Not Exceed Terrestrial Screening Levels
- Exceeds Terrestrial Screening Levels, Eliminated using Forensics Process
- Exceeds Terrestrial Screening Levels, Eliminated through Other Lines of Evidence
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 137.5 275 550

Scale in Feet

FIGURE 7
SEGMENT 10
TERRESTRIAL EVALUATION
SHEET 13 OF 13

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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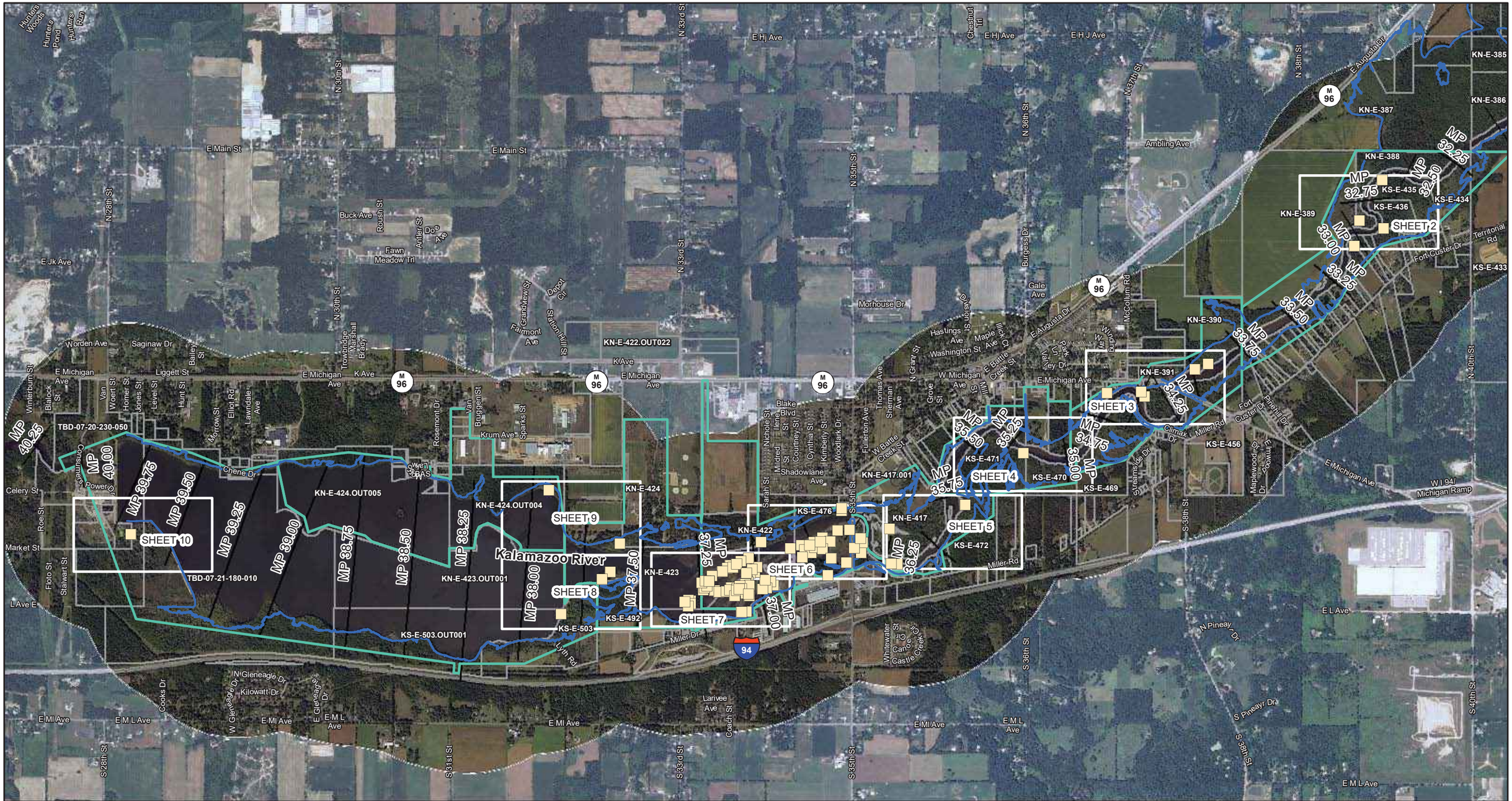

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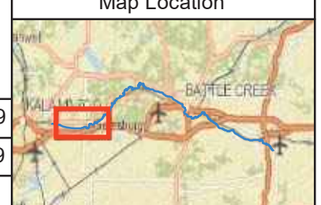

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 1,050 2,100 4,200

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 1 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

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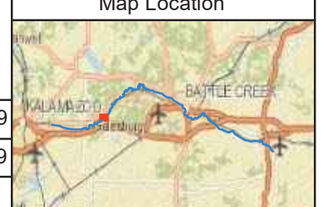
Project #:	60595643	

Map Location



Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 2 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

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Map Location

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 3 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

KN-E-411
KN-E-409
KN-E-413
KN-E-412
KN-E-408
KN-E-402.001
KN-E-414
KN-E-407.001
KN-E-403
KN-E-406
KN-E-415
KN-E-404
KN-E-405
MP 35.25
MP 35.50
SEKR3525L501,
0 - 0.5 ft
Kalamazoo River
MP 35.00
KS-E-471
KS-E-469
KS-E-470
MP 35.75

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Map Location

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 4 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Map Location

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 5 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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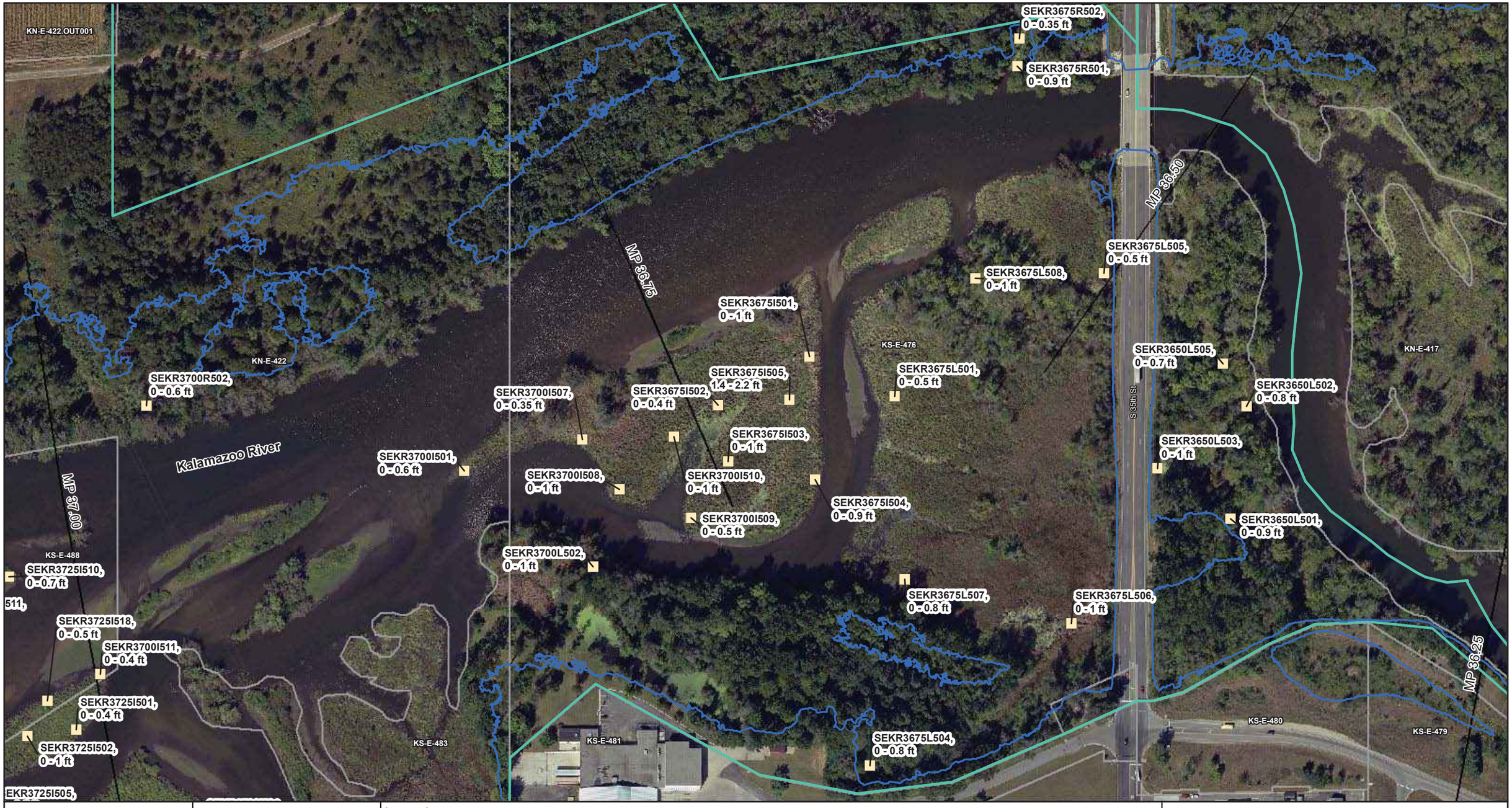

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Map Location

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 6 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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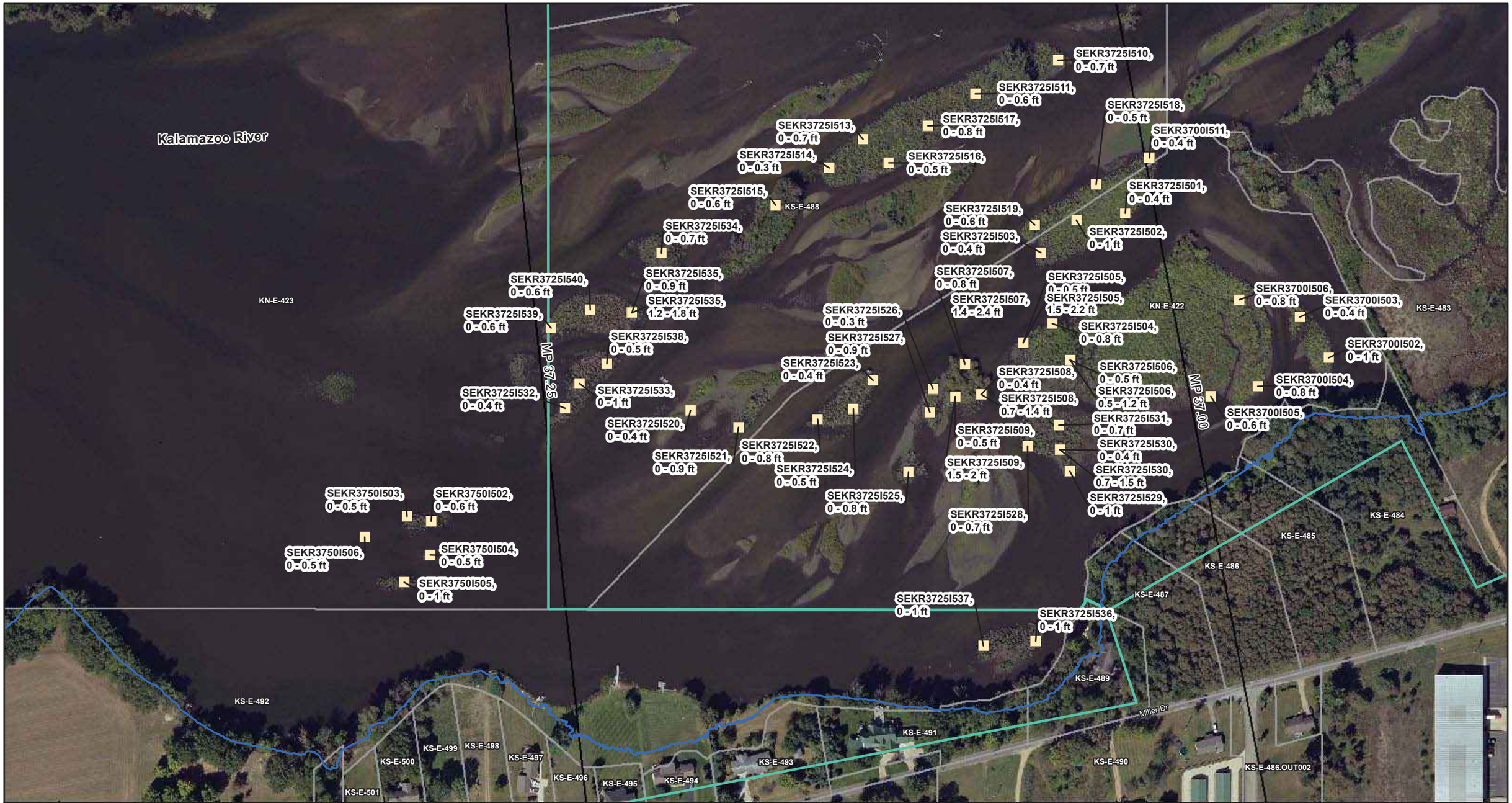

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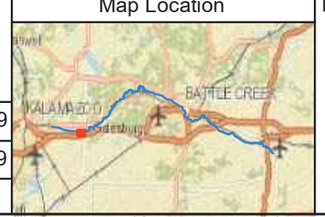

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 7 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

Kalamazoo River

KN-E-423

KN-E-423.OUT001

KS-E-503

KS-E-503.OUT001

KS-E-492

SEKR3775I501, 0 - 0.5 ft

SEKR3775I502, 0 - 0.4 ft

SEKR3800L501, 0 - 0.8 ft

MP 38.00

MP 37.75

MP 37.50

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Map Location

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 8 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Map Location

Legend

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- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 9 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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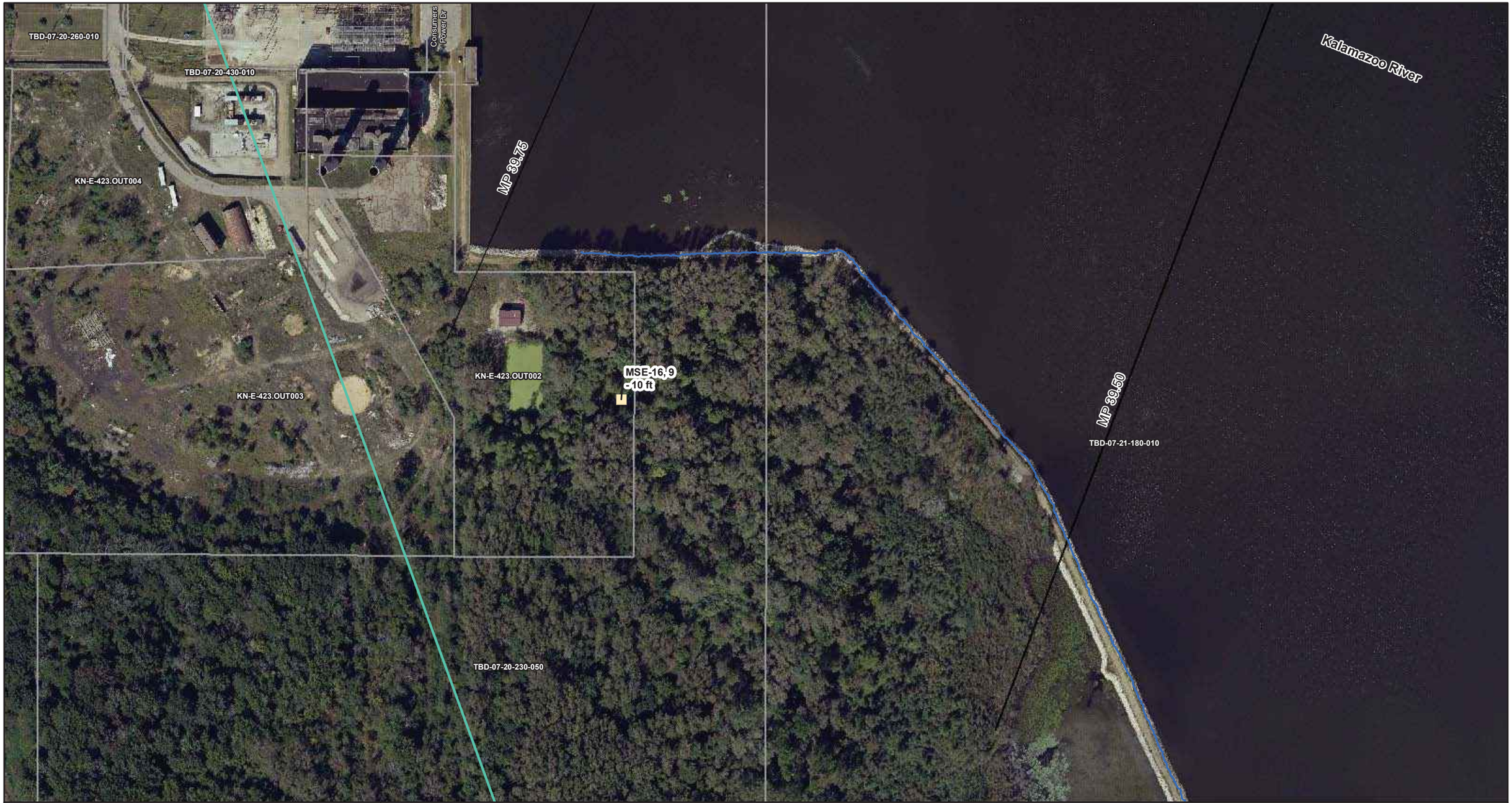

ENBRIDGE

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Map Location

Legend

- Aquatic Evaluation Sample Locations
- Quarter Mile Grid Segments
- Kalamazoo River Flood Inundation Boundary
- Reach 41 through Reach 48
- Parcel

N

0 100 200 400

Scale in Feet

FIGURE 8
SEGMENT 10
SEDIMENT SAMPLES FOR
AQUATIC EVALUATION
SHEET 10 OF 10

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: September 2015 over 2010

Tables

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	Part 201 Generic Residential Cleanup Criteria				Target Detection Limits - Soil	6/20/2014 9:45 AM	6/18/2014 10:40 AM	6/19/2014 11:00 AM	6/18/2014 3:50 PM	6/20/2014 10:50 AM	3/5/2012 4:05 PM	3/5/2012 4:35 PM	3/5/2012 4:55 PM
	Location	Direct Contact Criteria	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria		SBKR0000I 501	SBKR0000I 502	SBKR0000I 503	SBKR0000I 504	SBKR0000I 505	SBKR0000L 201	SBKR0000L 202	SBKR0000L 203
	Sample						SBKR0000I 501S 062014S005	SBKR0000I 502S 061814S008	SBKR0000I 503S 061914S006	SBKR0000I 504S 061814S008	SBKR0000I 505S 062014S008	SBKR0000L 201S 030512S007	SBKR0000L 202S 030512S006	SBKR0000L 203S 030512S006
	Depth						0 - 0.5 ft	0 - 0.8 ft	0 - 0.6 ft	0 - 0.8 ft	0 - 0.8 ft	0 - 0.7 ft	0 - 0.6 ft	0 - 0.6 ft
	USCS Code						OL	OL	OL	OL	OL	OL	OL	OL
	Saturation Status						Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated
Analyte	Units						Result	Result	Result	Result	Result	Result	Result	Result
Metals														
Beryllium	mg/kg	410	51	250(G)	NLV	0.5	< 0.50	**0.72**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.74
Molybdenum	mg/kg	2600(B)	1.5(B)	64(B)(X)	(B)NLV	1	**4.1**	**1.2**	< 1.0	< 1.0	**1.1**	**2.9**	< 1.0	< 1.5
Nickel	mg/kg	40000(B)	100(B)	110(B)(G)	(B)NLV	1	**13**	**22**	**9.3**	**13**	**12**	**15**	**18**	**23**
Vanadium	mg/kg	750(DD)	72	430	NLV	1	**14**	**26**	**11**	**11**	**18**	**19**	**17**	**18**
PNA														
2-Methylnaphthalene	ug/kg	8.1e+006	57000	4200	2.7e+006	330	< 330	< 330	< 330	< 330	< 330	< 100	< 110	< 190
Acenaphthene	ug/kg	4.1e+007	300000	8700	1.9e+008	330	< 330	< 330	< 330	< 330	< 330	< 100	< 110	< 190
Acenaphthylene	ug/kg	1.6e+006	5900	ID	1.6e+006	330	< 330	**520**	< 330	**1100**	< 330	< 100	**170**	< 190
Anthracene	ug/kg	2.3e+008	41000	ID	1e+009(D)	330	< 330	< 330	< 330	**1900**	< 330	< 100	**200**	< 190
Benzo(a)anthracene	ug/kg	20000(Q)	(Q)NLL	(Q)NLL	(Q)NLV	330	< 330	**1800**	**400**	**6500**	**510**	**260**	**1300**	**980**
Benzo(a)pyrene	ug/kg	2000(Q)	(Q)NLL	(Q)NLL	(Q)NLV	330	**350**	**2400**	**520**	**6400**	**660**	**270**	**1500**	**1200**
Benzo(b)fluoranthene	ug/kg	20000(Q)	(Q)NLL	(Q)NLL	(Q)ID	330	< 330	**2300**	**460**	**7700**	**540**	**350**	**1500**	**1300**
Benzo(g,h,i)perylene	ug/kg	2.5e+006	NLL	NLL	NLV	330	< 330	**1500**	**350**	**3300**	**420**	**230**	**1200**	**970**
Benzo(k)fluoranthene	ug/kg	200000(Q)	(Q)NLL	(Q)NLL	(Q)NLV	330	< 330	**910**	< 330	**2800**	< 330	**150**	**780**	**510**
Chrysene	ug/kg	2e+006(Q)	(Q)NLL	(Q)NLL	(Q)ID	330	< 330	**1800**	< 330	**5800**	< 330	**260**	**1200**	**1000**
Dibenzo(a,h)anthracene	ug/kg	2000(Q)	(Q)NLL	(Q)NLL	(Q)NLV	330	< 330	**440**	< 330	**980**	< 330	< 100	**99**	< 190
Fluoranthene	ug/kg	4.6e+007	730000	5500	1e+009(D)	330	< 330	**2400**	**430**	**13000**	**500**	**430**	**1900**	**1400**
Fluorene	ug/kg	2.7e+007	390000	5300	5.8e+008	330	< 330	< 330	< 330	**520**	< 330	< 100	< 110	< 190
Indeno(1,2,3-c,d)pyrene	ug/kg	20000(Q)	(Q)NLL	(Q)NLL	(Q)NLV	330	< 330	**1400**	**420**	**3700**	**550**	**180**	**860**	**700**
Naphthalene	ug/kg	1.6e+007	35000	730	250000	330	< 330	< 330	< 330	< 330	< 330	< 100	< 110	< 190
Phenanthrene	ug/kg	1.6e+006	56000	2100	2.8e+006	330	< 330	**560**	< 330	**4700**	< 330	**170**	**590**	**430**
Pyrene	ug/kg	2.9e+007	480000	ID	1e+009(D)	330	< 330	**2300**	**390**	**11000**	**420**	**370**	**2000**	**1300**
Solids														
Moisture	%	NCE	NCE	NCE	NCE	NCE	**63**	**68**	**57**	**38**	**64**	**50**	**56**	**74**
TPH														
Diesel Range Organics (C10-C20)	mg/kg	NCE	NCE	NCE	NCE	10	---	---	---	---	---	< 20	**24**	< 38
Gasoline Range Organics (C6-C10)	mg/kg	NCE	NCE	NCE	NCE	10	---	---	---	---	---	< 4.0	< 4.0	< 4.0
Oil Range Organics (C20-C34)	mg/kg	NCE	NCE	NCE	NCE	20	---	---	---	---	---	**230**	**290**	**460**
VOC														
1,1,1,2-Tetrachloroethane	ug/kg	480000(C)	1500	ID	6200	100	---	---	---	---	---	< 180	< 240	< 770
1,1,1-Trichloroethane	ug/kg	5e+008(C)	4000	1800	250000	50	---	---	---	---	---	< 180	< 240	< 770
1,1,2,2-Tetrachloroethane	ug/kg	53000	170	1600(X)	4300	50	---	---	---	---	---	< 180	< 240	< 770
1,1,2-Trichloroethane	ug/kg	180000	100	6600(X)	4600	50	---	---	---	---	---	< 180	< 240	< 770
1,1-Dichloroethane	ug/kg	2.7e+007(C)	18000	15000	230000	50	---	---	---	---	---	< 180	< 240	< 770

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	Part 201 Generic Residential Cleanup Criteria				Target Detection Limits - Soil	6/20/2014 9:45 AM	6/18/2014 10:40 AM	6/19/2014 11:00 AM	6/18/2014 3:50 PM	6/20/2014 10:50 AM	3/5/2012 4:05 PM	3/5/2012 4:35 PM	3/5/2012 4:55 PM
	Location	Direct Contact Criteria	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria		SBKR0000I 501	SBKR0000I 502	SBKR0000I 503	SBKR0000I 504	SBKR0000I 505	SBKR0000L 201	SBKR0000L 202	SBKR0000L 203
	Sample						SBKR0000I 501S 062014S005	SBKR0000I 502S 061814S008	SBKR0000I 503S 061914S006	SBKR0000I 504S 061814S008	SBKR0000I 505S 062014S008	SBKR0000L 201S 030512S007	SBKR0000L 202S 030512S006	SBKR0000L 203S 030512S006
	Depth						0 - 0.5 ft	0 - 0.8 ft	0 - 0.6 ft	0 - 0.8 ft	0 - 0.8 ft	0 - 0.7 ft	0 - 0.6 ft	0 - 0.6 ft
	USCS Code						OL	OL	OL	OL	OL	OL	OL	OL
	Saturation Status						Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated
Analyte	Units						Result	Result	Result	Result	Result	Result	Result	Result
1,1-Dichloroethylene	ug/kg	200000(I)	140(I)	2600(I)	62(I)	50	---	---	---	---	---	< 180	< 240	< 770
1,2,3-Trichlorobenzene	ug/kg	NCE	NCE	NCE	NCE	250	---	---	---	---	---	< 250	< 250	< 770
1,2,3-Trichloropropane	ug/kg	1.3e+006(C)	840	NA	4000	100	---	---	---	---	---	< 180	< 240	< 770
1,2,3-Trimethylbenzene	ug/kg	NCE	NCE	NCE	NCE	250	---	---	---	---	---	< 250	< 250	< 770
1,2,4-Trichlorobenzene	ug/kg	990000(DD)	4200	5900(X)	9.6e+006(C)	330	---	---	---	---	---	< 250	< 250	< 770
1,2,4-Trimethylbenzene	ug/kg	3.2e+007(C)	2100(I)	570(I)	4.3e+006(C)	100	---	---	---	---	---	< 180	< 240	< 770
1,2-Dichlorobenzene	ug/kg	1.9e+007(C)	14000	280	1.1e+007(C)	100	---	---	---	---	---	< 180	< 240	< 770
1,2-Dichloroethane	ug/kg	91000(I)	100(I)	7200(I)(X)	2100(I)	50	---	---	---	---	---	< 180	< 240	< 770
1,2-Dichloropropane	ug/kg	140000(I)	100(I)	4600(I)(X)	4000(I)	50	---	---	---	---	---	< 180	< 240	< 770
1,3,5-Trimethylbenzene	ug/kg	3.2e+007(C)	1800(I)	1100(I)	2.6e+006(C)	100	---	---	---	---	---	< 180	< 240	< 770
1,3-Dichlorobenzene	ug/kg	200000(C)	170	680	26000	100	---	---	---	---	---	< 180	< 240	< 770
1,3-Dichloropropene, cis	ug/kg	NCE	NCE	NCE	NCE	50	---	---	---	---	---	< 180	< 240	< 770
1,3-Dichloropropene, trans	ug/kg	NCE	NCE	NCE	NCE	50	---	---	---	---	---	< 180	< 240	< 770
1,4-Dichloro-2-butene, trans	ug/kg	NCE	NCE	NCE	NCE	50	---	---	---	---	---	< 180	< 240	< 770
1,4-Dichlorobenzene	ug/kg	400000	1700	360	19000	100	---	---	---	---	---	< 180	< 240	< 770
2-Butanone (MEK)	ug/kg	1.2e+008(C,DD)	260000(I)	44000(I)	5.4e+007(C)	750	---	---	---	---	---	< 750	< 810	< 2600
2-Hexanone	ug/kg	3.2e+007(C)	20000	ID	990000	2500	---	---	---	---	---	< 2500	< 2500	< 2500
2-Methylnaphthalene	ug/kg	8.1e+006	57000	4200	2.7e+006	330	---	---	---	---	---	< 610	< 810	< 2600
4-Methyl-2-pentanone (MIBK)	ug/kg	5.6e+007(C)	36000(I)	(I)ID	3.7e+007(C)	2500	---	---	---	---	---	< 2500	< 2500	< 2500
Acetone	ug/kg	2.3e+007(I)	15000(I)	34000(I)	2.9e+008(C)	1000	---	---	---	---	---	< 1500	< 2000	< 6400
Acrylonitrile	ug/kg	16000(I)	100(I)(M);52	100(I)(M);40	6600(I)	100	---	---	---	---	---	< 180	< 240	< 770
Benzene	ug/kg	180000(I)	100(I)	4000(I)(X)	1600(I)	50	---	---	---	---	---	< 180	< 240	< 770
Bromobenzene	ug/kg	540000(I)	550(I)	(I)NA	310000(I)	100	---	---	---	---	---	< 180	< 240	< 770
Bromochloromethane	ug/kg	NCE	NCE	NCE	NCE	100	---	---	---	---	---	< 180	< 240	< 770
Bromodichloromethane	ug/kg	110000	1600(W)	ID	1200	100	---	---	---	---	---	< 180	< 240	< 770
Bromoform	ug/kg	820000	1600(W)	ID	150000	100	---	---	---	---	---	< 180	< 240	< 770
Bromomethane	ug/kg	320000	200	700	860	200	---	---	---	---	---	< 200	< 240	< 770
Carbon disulfide	ug/kg	7.2e+006(C,DD)	16000(I,R)	(I,R)ID	76000(I,R)	250	---	---	---	---	---	< 250	< 250	< 770
Carbon tetrachloride	ug/kg	96000	100	900(X)	190	50	---	---	---	---	---	< 180	< 240	< 770
Chlorobenzene	ug/kg	4.3e+006(C)	2000(I)	500(I)	120000(I)	50	---	---	---	---	---	< 180	< 240	< 770
Chloroethane	ug/kg	2.6e+006(C)	8600	22000(X)	2.9e+006(C)	250	---	---	---	---	---	< 610	< 810	< 2600
Chloroform	ug/kg	1.2e+006	1600(W)	7000	7200	50	---	---	---	---	---	< 180	< 240	< 770
Chloromethane	ug/kg	1.6e+006(C)	5200(I)	(I)ID	2300(I)	250	---	---	---	---	---	< 250	< 250	< 770
cis-1,2-Dichloroethylene	ug/kg	2.5e+006(C)	1400	12000	22000	50	---	---	---	---	---	< 180	< 240	< 770
Cyclohexane	ug/kg	NCE	NCE	NCE	NCE	500	---	---	---	---	---	< 500	< 500	< 770

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Enbridge Energy, Limited Partnership

	Date \ Time Collected	Part 201 Generic Residential Cleanup Criteria				Target Detection Limits - Soil	6/20/2014 9:45 AM	6/18/2014 10:40 AM	6/19/2014 11:00 AM	6/18/2014 3:50 PM	6/20/2014 10:50 AM	3/5/2012 4:05 PM	3/5/2012 4:35 PM	3/5/2012 4:55 PM
	Location	Direct Contact Criteria	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria		SBKR0000I 501	SBKR0000I 502	SBKR0000I 503	SBKR0000I 504	SBKR0000I 505	SBKR0000L 201	SBKR0000L 202	SBKR0000L 203
	Sample						SBKR0000I 501S 062014S005	SBKR0000I 502S 061814S008	SBKR0000I 503S 061914S006	SBKR0000I 504S 061814S008	SBKR0000I 505S 062014S008	SBKR0000L 201S 030512S007	SBKR0000L 202S 030512S006	SBKR0000L 203S 030512S006
	Depth						0 - 0.5 ft	0 - 0.8 ft	0 - 0.6 ft	0 - 0.8 ft	0 - 0.8 ft	0 - 0.7 ft	0 - 0.6 ft	0 - 0.6 ft
	USCS Code						OL	OL	OL	OL	OL	OL	OL	OL
	Saturation Status						Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated
Analyte	Units						Result	Result	Result	Result	Result	Result	Result	Result
Dibromochloromethane	ug/kg	110000	1600(W)	ID	3900	100	---	---	---	---	---	< 180	< 240	< 770
Dibromochloropropane	ug/kg	4400(C)	10(M);4	ID	220(C)	10	---	---	---	---	---	< 180	< 240	< 770
Dibromomethane	ug/kg	2.5e+006(C)	1600	NA	ID	250	---	---	---	---	---	< 250	< 250	< 770
Dichlorodifluoromethane	ug/kg	5.2e+007(C)	95000	ID	900000	250	---	---	---	---	---	< 250	< 250	< 770
Diethyl ether	ug/kg	1.1e+008(C)	200	ID	2.8e+007(C)	200	---	---	---	---	---	< 200	< 240	< 770
Di-isopropyl ether (DIPE)	ug/kg	920000(C)	600	ID	670000(C)	250	---	---	---	---	---	< 250	< 250	< 770
Ethylbenzene	ug/kg	2.2e+007(C)	1500(I)	360(I)	87000(I)	50	---	---	---	---	---	< 180	< 240	< 770
Ethylene dibromide	ug/kg	92	20(M);1	110(X)	670	20	---	---	---	---	---	< 180	< 240	< 770
Ethyl-tert-butyl ether (ETBE)	ug/kg	ID	980	ID	540000	250	---	---	---	---	---	< 250	< 250	< 770
Hexachloroethane	ug/kg	230000	430	1800(X)	40000	300	---	---	---	---	---	< 300	< 300	< 770
Isopropyl benzene	ug/kg	2.5e+007(C)	91000	3200	400000(C)	250	---	---	---	---	---	< 250	< 250	< 770
m&p-Xylene	ug/kg	(J)	(J)	(J)	(J)	100	---	---	---	---	---	< 360	< 490	< 1500
Methyl Iodide	ug/kg	NCE	NCE	NCE	NCE	100	---	---	---	---	---	< 180	< 240	< 770
Methylene chloride	ug/kg	1.3e+006	100	30000(X)	45000	100	---	---	---	---	---	< 180	< 240	< 770
Methyl-tert-butyl ether (MTBE)	ug/kg	1.5e+006	800	140000(X)	9.9e+006(C)	250	---	---	---	---	---	< 250	< 250	< 770
Naphthalene	ug/kg	1.6e+007	35000	730	250000	330	---	---	---	---	---	< 610	< 810	< 2600
n-Butylbenzene	ug/kg	2.5e+006	1600	ID	ID	50	---	---	---	---	---	< 180	< 240	< 770
n-Propylbenzene	ug/kg	2.5e+006(I)	1600(I)	(I)ID	(I)ID	100	---	---	---	---	---	< 180	< 240	< 770
o-Xylene	ug/kg	(J)	(J)	(J)	(J)	50	---	---	---	---	---	< 180	< 240	< 770
p-Isopropyl toluene (p-Cymene)	ug/kg	NCE	NCE	NCE	NCE	100	---	---	---	---	---	< 180	< 240	< 770
sec-Butylbenzene	ug/kg	2.5e+006	1600	ID	ID	50	---	---	---	---	---	< 180	< 240	< 770
Styrene	ug/kg	400000	2700	2100(X)	250000	50	---	---	---	---	---	< 180	< 240	< 770
t-Amyl methyl ether (TAME)	ug/kg	2.9e+007(C)	3900	NA	58000	250	---	---	---	---	---	< 250	< 250	< 770
t-Butyl alcohol	ug/kg	1.2e+008(C)	78000	NA	3.1e+008(C)	2500	---	---	---	---	---	< 2500	< 2500	< 2600
t-Butylbenzene	ug/kg	2.5e+006(I)	1600(I)	(I)ID	(I)ID	50	---	---	---	---	---	< 180	< 240	< 770
Tetrachloroethylene	ug/kg	200000(C)	100	1200(X)	11000	50	---	---	---	---	---	< 180	< 240	< 770
Tetrahydrofuran	ug/kg	2.9e+006	1900	220000(X)	1.3e+006	1000	---	---	---	---	---	< 1000	< 1000	< 2600
Toluene	ug/kg	5e+007(C)	16000(I)	5400(I)	330000(C)	100	---	---	---	---	---	< 180	< 240	< 770
Total BTEX	ug/kg	NCE	NCE	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770
trans-1,2-Dichloroethylene	ug/kg	3.8e+006(C)	2000	30000(X)	23000	50	---	---	---	---	---	< 180	< 240	< 770
Trichloroethylene	ug/kg	500000(C,DD)	100	4000(X)	1000	50	---	---	---	---	---	< 180	< 240	< 770
Trichlorofluoromethane	ug/kg	7.9e+007(C)	52000	NA	2.8e+006(C)	100	---	---	---	---	---	< 180	< 240	< 770
Vinyl chloride	ug/kg	3800	40	260(X)	270	40	---	---	---	---	---	< 180	< 240	< 770
Xylenes	ug/kg	4.1e+008(C)	5600(I)	820(I)	6.3e+006(C)	150	---	---	---	---	---	< 360	< 490	< 1500

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Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 2:10 PM	3/6/2012 3:00 PM	3/6/2012 11:45 AM	6/25/2014 9:55 AM	6/26/2014 10:55 AM	6/26/2014 2:00 PM	6/27/2014 9:55 AM	6/30/2014 2:25 PM	7/1/2014 10:30 AM	7/1/2014 1:30 PM	3/5/2012 2:15 PM	3/5/2012 2:50 PM	3/5/2012 3:25 PM	3/6/2012 9:35 AM	3/6/2012 3:45 PM
	Location	SBKR0000L 204	SBKR0000L 205	SBKR0000L 206	SBKR0000L 501	SBKR0000L 502	SBKR0000L 503	SBKR0000L 504	SBKR0000L 505	SBKR0000L 506	SBKR0000L 507	SBKR0000R 201	SBKR0000R 202	SBKR0000R 203	SBKR0000R 204	SBKR0000R 205
	Sample	SBKR0000L 204S 030612S006	SBKR0000L 205S 030612S007	SBKR0000L 206S 030612S005	SBKR0000L 501S 062514S006	SBKR0000L 502S 062614S006	SBKR0000L 503S 062614S009	SBKR0000L 504S 062714S008	SBKR0000L 505S 063014S010	SBKR0000L 506S 070114S006	SBKR0000L 507S 070114S006	SBKR0000R 201S 030512S010	SBKR0000R 202S 030512S008	SBKR0000R 203S 030512S009	SBKR0000R 204S 030612S007	SBKR0000R 205S 030612S005
	Depth	0 - 0.6 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.9 ft	0 - 0.8 ft	0 - 1 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 1 ft	0 - 0.8 ft	0 - 0.9 ft	0 - 0.7 ft	0 - 0.5 ft
	USCS Code	OL	OL	OL	OL	OL	OL	ML	ML	ML	ML	OL	OL	OL	OL	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals																
Beryllium	mg/kg	< 0.50	**0.54**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Molybdenum	mg/kg	< 1.0	**1.4**	< 1.0	**4.3**	< 1.0	**1.3**	< 1.0	< 1.0	**2.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	mg/kg	**11**	**16**	**19**	**15**	**9.3**	**16**	**14**	**12**	**22**	**9.7**	**13**	**8.5**	**20**	**15**	**12**
Vanadium	mg/kg	**11**	**16**	**15**	**18**	**14**	**21**	**11**	**7.4**	**10**	**9.1**	**15**	**16**	**20**	**8.4**	**19**
PNA																
2-Methylnaphthalene	ug/kg	< 90	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**140**	< 150	< 94	< 95
Acenaphthene	ug/kg	< 90	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	< 75	**250**	< 94	< 95
Acenaphthylene	ug/kg	**300**	< 140	**170**	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**88**	**1300**	< 94	< 95
Anthracene	ug/kg	**910**	< 140	**230**	< 330	< 330	< 330	**640**	**1100**	< 330	< 330	< 820	< 75	**1700**	< 94	< 95
Benzo(a)anthracene	ug/kg	**2300**	**440**	**1400**	**580**	< 330	**400**	**1700**	**3600**	< 330	< 330	< 820	**370**	**9400**	**230**	< 95
Benzo(a)pyrene	ug/kg	**2600**	**580**	**1700**	**640**	< 330	**470**	**1500**	**4200**	**370**	< 330	< 820	**360**	**12000**	**270**	< 95
Benzo(b)fluoranthene	ug/kg	**2800**	**670**	**2000**	**740**	< 330	**510**	**1600**	**4100**	**370**	< 330	< 820	**520**	**13000**	**370**	< 95
Benzo(g,h,i)perylene	ug/kg	**1800**	**460**	**1200**	**410**	< 330	< 330	**620**	**2400**	< 330	< 330	< 820	**220**	**7300**	**240**	< 95
Benzo(k)fluoranthene	ug/kg	**1300**	**300**	**690**	< 330	< 330	< 330	**710**	**2200**	< 330	< 330	< 820	**240**	**4200**	**190**	< 95
Chrysene	ug/kg	**2300**	**460**	**1400**	**450**	< 330	< 330	**1300**	**2700**	< 330	< 330	< 820	**500**	**9600**	**290**	< 95
Dibenzo(a,h)anthracene	ug/kg	**140**	< 140	**100**	< 330	< 330	< 330	< 330	**980**	< 330	< 330	< 820	< 75	**590**	< 94	< 95
Fluoranthene	ug/kg	**3400**	**660**	**2300**	**1100**	**330**	**880**	**3200**	**5700**	**540**	< 330	< 820	**1200**	**14000**	**470**	**91**
Fluorene	ug/kg	**94**	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**130**	**350**	< 94	< 95
Indeno(1,2,3-c,d)pyrene	ug/kg	**1400**	**320**	**880**	**550**	< 330	**370**	**930**	**3300**	< 330	< 330	< 820	**210**	**5500**	**190**	< 95
Naphthalene	ug/kg	< 90	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**160**	**250**	< 94	< 95
Phenanthrene	ug/kg	**1100**	**200**	**690**	**470**	< 330	**440**	**1100**	**1200**	< 330	< 330	< 820	**1500**	**4300**	**170**	< 95
Pyrene	ug/kg	**3600**	**730**	**2300**	**710**	< 330	**600**	**2200**	**4100**	**420**	< 330	< 820	**860**	**14000**	**410**	**140**
Solids																
Moisture	%	**45**	**68**	**49**	**63**	**36**	**30**	**53**	**37**	**41**	**48**	**41**	**35**	**68**	**52**	**51**
TPH																
Diesel Range Organics (C10-C20)	mg/kg	**56**	< 29	**49**	---	---	---	---	---	---	---	< 1600	**20**	**99**	< 19	**19**
Gasoline Range Organics (C6-C10)	mg/kg	< 4.0	< 4.0	< 4.0	---	---	---	---	---	---	---	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Oil Range Organics (C20-C34)	mg/kg	**590**	**180**	**380**	---	---	---	---	---	---	---	**6100**	**180**	**1000**	**310**	**190**
VOC																
1,1,1,2-Tetrachloroethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
1,1,1-Trichloroethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,1,2,2-Tetrachloroethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,1,2-Trichloroethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,1-Dichloroethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 2:10 PM	3/6/2012 3:00 PM	3/6/2012 11:45 AM	6/25/2014 9:55 AM	6/26/2014 10:55 AM	6/26/2014 2:00 PM	6/27/2014 9:55 AM	6/30/2014 2:25 PM	7/1/2014 10:30 AM	7/1/2014 1:30 PM	3/5/2012 2:15 PM	3/5/2012 2:50 PM	3/5/2012 3:25 PM	3/6/2012 9:35 AM	3/6/2012 3:45 PM
	Location	SBKR0000L 204	SBKR0000L 205	SBKR0000L 206	SBKR0000L 501	SBKR0000L 502	SBKR0000L 503	SBKR0000L 504	SBKR0000L 505	SBKR0000L 506	SBKR0000L 507	SBKR0000R 201	SBKR0000R 202	SBKR0000R 203	SBKR0000R 204	SBKR0000R 205
	Sample	SBKR0000L 204S 030612S006	SBKR0000L 205S 030612S007	SBKR0000L 206S 030612S005	SBKR0000L 501S 062514S006	SBKR0000L 502S 062614S006	SBKR0000L 503S 062614S009	SBKR0000L 504S 062714S008	SBKR0000L 505S 063014S010	SBKR0000L 506S 070114S006	SBKR0000L 507S 070114S006	SBKR0000R 201S 030512S010	SBKR0000R 202S 030512S008	SBKR0000R 203S 030512S009	SBKR0000R 204S 030612S007	SBKR0000R 205S 030612S005
	Depth	0 - 0.6 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.9 ft	0 - 0.8 ft	0 - 1 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 1 ft	0 - 0.8 ft	0 - 0.9 ft	0 - 0.7 ft	0 - 0.5 ft
	USCS Code	OL	OL	OL	OL	OL	OL	ML	ML	ML	ML	OL	OL	OL	OL	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
1,1-Dichloroethylene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,2,3-Trichlorobenzene	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
1,2,3-Trichloropropane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
1,2,3-Trimethylbenzene	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
1,2,4-Trichlorobenzene	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
1,2,4-Trimethylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
1,2-Dichlorobenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
1,2-Dichloroethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,2-Dichloropropane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,3,5-Trimethylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
1,3-Dichlorobenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
1,3-Dichloropropene, cis	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,3-Dichloropropene, trans	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,4-Dichloro-2-butene, trans	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
1,4-Dichlorobenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
2-Butanone (MEK)	ug/kg	< 750	< 1600	< 750	---	---	---	---	---	---	---	< 750	< 750	< 1600	< 750	< 750
2-Hexanone	ug/kg	< 2500	< 2500	< 2500	---	---	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500	< 2500
2-Methylnaphthalene	ug/kg	< 480	< 1600	< 580	---	---	---	---	---	---	---	< 410	< 330	< 1600	< 650	< 650
4-Methyl-2-pentanone (MIBK)	ug/kg	< 2500	< 2500	< 2500	---	---	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500	< 2500
Acetone	ug/kg	< 1200	< 4100	< 1400	---	---	---	---	---	---	---	< 1000	< 1000	< 4100	< 1600	< 1600
Acrylonitrile	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Benzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Bromobenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Bromochloromethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Bromodichloromethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Bromoform	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Bromomethane	ug/kg	< 200	< 490	< 200	---	---	---	---	---	---	---	< 200	< 200	< 490	< 200	< 200
Carbon disulfide	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
Carbon tetrachloride	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Chlorobenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Chloroethane	ug/kg	< 480	< 1600	< 580	---	---	---	---	---	---	---	< 410	< 320	< 1600	< 650	< 650
Chloroform	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Chloromethane	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
cis-1,2-Dichloroethylene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Cyclohexane	ug/kg	< 500	< 500	< 500	---	---	---	---	---	---	---	< 500	< 500	< 500	< 500	< 500

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 2:10 PM	3/6/2012 3:00 PM	3/6/2012 11:45 AM	6/25/2014 9:55 AM	6/26/2014 10:55 AM	6/26/2014 2:00 PM	6/27/2014 9:55 AM	6/30/2014 2:25 PM	7/1/2014 10:30 AM	7/1/2014 1:30 PM	3/5/2012 2:15 PM	3/5/2012 2:50 PM	3/5/2012 3:25 PM	3/6/2012 9:35 AM	3/6/2012 3:45 PM
	Location	SBKR0000L 204	SBKR0000L 205	SBKR0000L 206	SBKR0000L 501	SBKR0000L 502	SBKR0000L 503	SBKR0000L 504	SBKR0000L 505	SBKR0000L 506	SBKR0000L 507	SBKR0000R 201	SBKR0000R 202	SBKR0000R 203	SBKR0000R 204	SBKR0000R 205
	Sample	SBKR0000L 204S 030612S006	SBKR0000L 205S 030612S007	SBKR0000L 206S 030612S005	SBKR0000L 501S 062514S006	SBKR0000L 502S 062614S006	SBKR0000L 503S 062614S009	SBKR0000L 504S 062714S008	SBKR0000L 505S 063014S010	SBKR0000L 506S 070114S006	SBKR0000L 507S 070114S006	SBKR0000R 201S 030512S010	SBKR0000R 202S 030512S008	SBKR0000R 203S 030512S009	SBKR0000R 204S 030612S007	SBKR0000R 205S 030612S005
	Depth	0 - 0.6 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.9 ft	0 - 0.8 ft	0 - 1 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 1 ft	0 - 0.8 ft	0 - 0.9 ft	0 - 0.7 ft	0 - 0.5 ft
	USCS Code	OL	OL	OL	OL	OL	OL	ML	ML	ML	ML	OL	OL	OL	OL	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Dibromochloromethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Dibromochloropropane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Dibromomethane	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
Dichlorodifluoromethane	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
Diethyl ether	ug/kg	< 200	< 490	< 200	---	---	---	---	---	---	---	< 200	< 200	< 490	< 200	< 200
Di-isopropyl ether (DIPE)	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
Ethylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Ethylene dibromide	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Ethyl-tert-butyl ether (ETBE)	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
Hexachloroethane	ug/kg	< 300	< 490	< 300	---	---	---	---	---	---	---	< 300	< 300	< 490	< 300	< 300
Isopropyl benzene	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
m&p-Xylene	ug/kg	< 290	< 980	< 350	---	---	---	---	---	---	---	< 240	< 190	< 980	< 390	< 390
Methyl Iodide	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Methylene chloride	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Methyl-tert-butyl ether (MTBE)	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
Naphthalene	ug/kg	< 480	< 1600	< 580	---	---	---	---	---	---	---	< 410	< 330	< 1600	< 650	< 650
n-Butylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
n-Propylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
o-Xylene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
p-Isopropyl toluene (p-Cymene)	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
sec-Butylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Styrene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
t-Amyl methyl ether (TAME)	ug/kg	< 250	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250	< 250
t-Butyl alcohol	ug/kg	< 2500	< 2500	< 2500	---	---	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500	< 2500
t-Butylbenzene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Tetrachloroethylene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Tetrahydrofuran	ug/kg	< 1000	< 1600	< 1000	---	---	---	---	---	---	---	< 1000	< 1000	< 1600	< 1000	< 1000
Toluene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Total BTEX	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
trans-1,2-Dichloroethylene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Trichloroethylene	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Trichlorofluoromethane	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200	< 190
Vinyl chloride	ug/kg	< 140	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200	< 190
Xylenes	ug/kg	< 290	< 980	< 350	---	---	---	---	---	---	---	< 240	< 190	< 980	< 390	< 390

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 11:15 AM	6/18/2014 12:00 PM	6/18/2014 2:35 PM	6/19/2014 9:25 AM	6/20/2014 11:55 AM	6/24/2014 1:50 PM	6/24/2014 11:30 AM	6/24/2014 11:33 AM	6/24/2014 11:35 AM	6/25/2014 11:15 AM	6/24/2014 3:30 PM
	Location	SBKR0000R 206	SBKR0000R 501	SBKR0000R 502	SBKR0000R 503	SBKR0000R 505	SBKR0000R 506	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507R1	SBKR0000R 508
	Sample	SBKR0000R 206S 030612S007	SBKR0000R 501S 061814S005	SBKR0000R 502S 061814S007	SBKR0000R 503S 061914S005	SBKR0000R 505S 062014S007	SBKR0000R 506S 062414S005	SBKR0000R 507S 062414S007	SBKR0000R 507S 062414S022	SBKR0000R 507S 062414S033	SBKR0000R 507R1S 062514S035	SBKR0000R 508S 062414S006
	Depth	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	2 - 2.2 ft	3 - 3.3 ft	2.2 - 3.5 ft	0 - 0.6 ft
	USCS Code	OL	OL	OL	OL	OL	SP-SM	OL	ML	ML/SP	ML	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Saturated	Saturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals												
Beryllium	mg/kg	**0.56**	< 0.61	**0.73**	< 0.53	**0.64**	< 0.50	< 0.60	< 0.50	< 0.50	< 0.56	< 0.50
Molybdenum	mg/kg	**2.2**	< 1.2	< 1.3	< 1.1	**3.1**	< 1.0	< 1.2	**1.4**	< 1.0	**2.7**	< 1.0
Nickel	mg/kg	**27**	**18**	**20**	**14**	**11**	**19**	**25**	**14**	**5.7**	**14**	**11**
Vanadium	mg/kg	**20**	**19**	**28**	**15**	**24**	**16**	**14**	**13**	**7.8**	**15**	**10**
PNA												
2-Methylnaphthalene	ug/kg	< 130	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330
Acenaphthene	ug/kg	< 130	< 330	< 330	< 330	< 330	< 330	< 330	**3300**	**970**	**630**	< 330
Acenaphthylene	ug/kg	**130**	**440**	**450**	< 330	< 330	< 330	< 330	**1400**	**2000**	**1800**	< 330
Anthracene	ug/kg	**120**	**490**	**420**	< 330	< 330	**740**	< 330	**2900**	**7000**	**1900**	< 330
Benzo(a)anthracene	ug/kg	**940**	**2400**	**2600**	**730**	< 330	**2600**	**610**	**9600**	**19000**	**12000**	**1000**
Benzo(a)pyrene	ug/kg	**1200**	**2800**	**3100**	**1000**	< 330	**2200**	**950**	**8000**	**17000**	**9500**	**840**
Benzo(b)fluoranthene	ug/kg	**1200**	**3100**	**3400**	**860**	< 330	**3100**	**1200**	**8800**	**19000**	**9700**	**1500**
Benzo(g,h,i)perylene	ug/kg	**940**	**1500**	**1700**	**610**	< 330	**1300**	**660**	**4300**	**8200**	**4900**	**780**
Benzo(k)fluoranthene	ug/kg	**560**	**1000**	**1300**	**390**	< 330	**1100**	**420**	**3300**	**5900**	**3500**	**560**
Chrysene	ug/kg	**940**	**2300**	**2400**	**570**	< 330	**2400**	**640**	**8200**	**16000**	**10000**	**1000**
Dibenzo(a,h)anthracene	ug/kg	< 130	**610**	**670**	< 330	< 330	< 330	< 330	**610**	**2500**	**1700**	< 330
Fluoranthene	ug/kg	**1200**	**3600**	**3500**	**900**	< 330	**5500**	**1200**	**22000**	**43000**	**19000**	**2400**
Fluorene	ug/kg	< 130	< 330	< 330	< 330	< 330	< 330	< 330	**2300**	**2100**	**910**	< 330
Indeno(1,2,3-c,d)pyrene	ug/kg	**660**	**1700**	**1900**	**770**	< 330	**1600**	**1100**	**4700**	**9500**	**5000**	**1100**
Naphthalene	ug/kg	< 130	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330
Phenanthrene	ug/kg	**410**	**980**	**890**	< 330	< 330	**1900**	**330**	**6100**	**11000**	**1700**	**770**
Pyrene	ug/kg	**1500**	**3500**	**3600**	**820**	< 330	**4400**	**1100**	**22000**	**34000**	**26000**	**2100**
Solids												
Moisture	%	**63**	**70**	**76**	**65**	**49**	**28**	**72**	**63**	**23**	**65**	**46**
TPH												
Diesel Range Organics (C10-C20)	mg/kg	< 27	---	---	---	---	---	---	---	---	---	---
Gasoline Range Organics (C6-C10)	mg/kg	< 4.0	---	---	---	---	---	---	---	---	---	---
Oil Range Organics (C20-C34)	mg/kg	**180**	---	---	---	---	---	---	---	---	---	---
VOC												
1,1,1,2-Tetrachloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,1,2,2-Tetrachloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 11:15 AM	6/18/2014 12:00 PM	6/18/2014 2:35 PM	6/19/2014 9:25 AM	6/20/2014 11:55 AM	6/24/2014 1:50 PM	6/24/2014 11:30 AM	6/24/2014 11:33 AM	6/24/2014 11:35 AM	6/25/2014 11:15 AM	6/24/2014 3:30 PM
	Location	SBKR0000R 206	SBKR0000R 501	SBKR0000R 502	SBKR0000R 503	SBKR0000R 505	SBKR0000R 506	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507R1	SBKR0000R 508
	Sample	SBKR0000R 206S 030612S007	SBKR0000R 501S 061814S005	SBKR0000R 502S 061814S007	SBKR0000R 503S 061914S005	SBKR0000R 505S 062014S007	SBKR0000R 506S 062414S005	SBKR0000R 507S 062414S007	SBKR0000R 507S 062414S022	SBKR0000R 507S 062414S033	SBKR0000R 507R1S 062514S035	SBKR0000R 508S 062414S006
	Depth	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	2 - 2.2 ft	3 - 3.3 ft	2.2 - 3.5 ft	0 - 0.6 ft
	USCS Code	OL	OL	OL	OL	OL	SP-SM	OL	ML	ML/SP	ML	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Saturated	Saturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
1,1-Dichloroethylene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2,3-Trichlorobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2,3-Trichloropropane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2,3-Trimethylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2,4-Trichlorobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2-Dichloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,2-Dichloropropane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,3-Dichloropropene, cis	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,3-Dichloropropene, trans	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,4-Dichloro-2-butene, trans	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
2-Butanone (MEK)	ug/kg	< 1200	---	---	---	---	---	---	---	---	---	---
2-Hexanone	ug/kg	< 2500	---	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	ug/kg	< 1200	---	---	---	---	---	---	---	---	---	---
4-Methyl-2-pentanone (MIBK)	ug/kg	< 2500	---	---	---	---	---	---	---	---	---	---
Acetone	ug/kg	< 3000	---	---	---	---	---	---	---	---	---	---
Acrylonitrile	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Benzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Bromobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Bromochloromethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Bromodichloromethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Bromoform	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Bromomethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Carbon disulfide	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Carbon tetrachloride	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Chlorobenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Chloroethane	ug/kg	< 1200	---	---	---	---	---	---	---	---	---	---
Chloroform	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Chloromethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethylene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Cyclohexane	ug/kg	< 500	---	---	---	---	---	---	---	---	---	---

Table 1. Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 11:15 AM	6/18/2014 12:00 PM	6/18/2014 2:35 PM	6/19/2014 9:25 AM	6/20/2014 11:55 AM	6/24/2014 1:50 PM	6/24/2014 11:30 AM	6/24/2014 11:33 AM	6/24/2014 11:35 AM	6/25/2014 11:15 AM	6/24/2014 3:30 PM
	Location	SBKR0000R 206	SBKR0000R 501	SBKR0000R 502	SBKR0000R 503	SBKR0000R 505	SBKR0000R 506	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507R1	SBKR0000R 508
	Sample	SBKR0000R 206S 030612S007	SBKR0000R 501S 061814S005	SBKR0000R 502S 061814S007	SBKR0000R 503S 061914S005	SBKR0000R 505S 062014S007	SBKR0000R 506S 062414S005	SBKR0000R 507S 062414S007	SBKR0000R 507S 062414S022	SBKR0000R 507S 062414S033	SBKR0000R 507R1S 062514S035	SBKR0000R 508S 062414S006
	Depth	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	2 - 2.2 ft	3 - 3.3 ft	2.2 - 3.5 ft	0 - 0.6 ft
	USCS Code	OL	OL	OL	OL	OL	SP-SM	OL	ML	ML/SP	ML	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Saturated	Saturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Dibromochloromethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Dibromochloropropane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Dibromomethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Dichlorodifluoromethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Diethyl ether	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Di-isopropyl ether (DIPE)	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Ethylene dibromide	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Ethyl-tert-butyl ether (ETBE)	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Hexachloroethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Isopropyl benzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
m&p-Xylene	ug/kg	< 720	---	---	---	---	---	---	---	---	---	---
Methyl Iodide	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Methylene chloride	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Methyl-tert-butyl ether (MTBE)	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Naphthalene	ug/kg	< 1200	---	---	---	---	---	---	---	---	---	---
n-Butylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
n-Propylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
o-Xylene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
p-Isopropyl toluene (p-Cymene)	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
sec-Butylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Styrene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
t-Amyl methyl ether (TAME)	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
t-Butyl alcohol	ug/kg	< 2500	---	---	---	---	---	---	---	---	---	---
t-Butylbenzene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Tetrachloroethylene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Tetrahydrofuran	ug/kg	< 1200	---	---	---	---	---	---	---	---	---	---
Toluene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Total BTEX	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
trans-1,2-Dichloroethylene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Trichloroethylene	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Trichlorofluoromethane	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Vinyl chloride	ug/kg	< 360	---	---	---	---	---	---	---	---	---	---
Xylenes	ug/kg	< 720	---	---	---	---	---	---	---	---	---	---

Table 1. Footnotes - Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

Soil Footnotes:
Criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects new criteria rules, numbered from 299.1 to 299.50 which became effective on December 30, 2013.
MDEQ Operational Memorandum 2, Attachment 5 states that soil samples taken from the saturated zone cannot be accurately compared to criteria developed for unsaturated soils.
Bold values are concentrations detected above the reporting limit.
Shaded values exceed Part 201 Generic Residential Cleanup Criteria.
Shaded values indicate that the laboratory Reporting Limit value exceeds Part 201 Generic Residential Cleanup Criteria.
(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.
(C) = The criterion developed under R 299.20 to R 299.26 exceeds the chemical-specific soil saturation screening level (C_{sat}). The person proposing or implementing response activity shall document whether additional response activity is required to control free-phase liquids or NAPL to protect against risks associated with free-phase liquids by using methods appropriate for the free-phase liquids present. Development of a site-specific C_{sat} or methods presented in R 299.22, R 299.24(5), and R 299.26(8) may be conducted for the relevant exposure pathways.
(D) = Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1.0E+9 parts per billion (ppb).
(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environmental Quality (DEQ) internet web site. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)
(I) = Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.
(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.
(M) = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.
(Q) = Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene.
(R) = Hazardous substance may exhibit the characteristic of reactivity as defined in 40 C.F.R. §261.23 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost.
(W) = Concentrations of trihalomethanes in groundwater shall be added together to determine compliance with the Michigan drinking water standard of 80 ug/L. Concentrations of trihalomethanes in soil shall be added together to determine compliance with the drinking water protection criterion of 1,600 ug/kg.
(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)

Table 1. Footnotes - Kalamazoo River Background Soil Analytical Data
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

(DD) = Hazardous substance causes developmental effects. Residential direct contact criteria are protective of both prenatal and postnatal exposure. Nonresidential direct contact criteria are protective for a pregnant adult receptor.
--- = not completed/not analyzed.
ft = feet.
ID = insufficient data to develop criterion.
mg/kg = milligrams per kilogram.
NA = a criterion or value is not available or, in the case of background and CAS numbers, not applicable.
NCE = no criteria established.
NLL = hazardous substance is not likely to leach under most soil conditions.
NLV = hazardous substance is not likely to volatilize under most conditions.
PNA = polynuclear aromatic hydrocarbon.
TPH = total petroleum hydrocarbon.
ug/kg = micrograms per kilogram.
USCS = Unified Soil Classification System.
VOC = volatile organic compound.

Unified Soil Classification System (USCS) Code Footnotes:
ML = Silt or silt with sand or silt with gravel or sandy silt or sandy silt with gravel or gravelly silt or gravelly silt with sand.
ML/SP = Sample collected over interval containing both ML and SP soil types.
OL = Organic silts or organic silty clays of low plasticity.
SP-SM = Poorly graded sand or poorly graded sand with gravel (SP) to silty sand or silty sand with gravel (SM).

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

Analyte	Units	Terrestrial Ecological Screening Level	Terrestrial Soil Screening Level	Terrestrial Background Concentration	Date \ Time Collected	6/20/2014 9:45 AM	6/18/2014 10:40 AM	6/19/2014 11:00 AM	6/18/2014 3:50 PM	6/20/2014 10:50 AM	3/5/2012 4:05 PM	3/5/2012 4:35 PM	3/5/2012 4:55 PM	3/6/2012 2:10 PM
					Location	SBKR0000I 501	SBKR0000I 502	SBKR0000I 503	SBKR0000I 504	SBKR0000I 505	SBKR0000L 201	SBKR0000L 202	SBKR0000L 203	SBKR0000L 204
					Sample	SBKR0000I 501S 062014S005	SBKR0000I 502S 061814S008	SBKR0000I 503S 061914S006	SBKR0000I 504S 061814S008	SBKR0000I 505S 062014S008	SBKR0000L 201S 030512S007	SBKR0000L 202S 030512S006	SBKR0000L 203S 030512S006	SBKR0000L 204S 030612S006
					Depth	0 - 0.5 ft	0 - 0.8 ft	0 - 0.6 ft	0 - 0.8 ft	0 - 0.8 ft	0 - 0.7 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.6 ft
					USCS Code	OL	OL	OL	OL	OL	OL	OL	OL	OL
					Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Unsaturated
						Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals														
Beryllium	mg/kg	1.06	21(M)	NCE		< 0.50	**0.72**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.74	< 0.50
Molybdenum	mg/kg	NCE	NCE	NCE		**4.1**	**1.2**	< 1.0	< 1.0	**1.1**	**2.9**	< 1.0	< 1.5	< 1.0
Nickel	mg/kg	13.6	38(P)	NCE		**13**	**22**	**9.3**	**13**	**12**	**15**	**18**	**23**	**11**
Vanadium	mg/kg	1.59	7.8(A)	NCE		**14**	**26**	**11**	**11**	**18**	**19**	**17**	**18**	**11**
PNA														
2-Methylnaphthalene (LMW)	ug/kg	3240	NCE	NCE		< 330	< 330	< 330	< 330	< 330	< 100	< 110	< 190	< 90
Acenaphthene (LMW)	ug/kg	682000	NCE	NCE		< 330	< 330	< 330	< 330	< 330	< 100	< 110	< 190	< 90
Acenaphthylene (LMW)	ug/kg	682000	NCE	NCE		< 330	**520**	< 330	**1100**	< 330	< 100	**170**	< 190	**300**
Anthracene (LMW)	ug/kg	1.48e+006	NCE	NCE		< 330	< 330	< 330	**1900**	< 330	< 100	**200**	< 190	**910**
Benzo(a)anthracene (HMW)	ug/kg	5210	NCE	NCE		< 330	**1800**	**400**	**6500**	**510**	**260**	**1300**	**980**	**2300**
Benzo(a)pyrene (HMW)	ug/kg	1520	NCE	NCE		**350**	**2400**	**520**	**6400**	**660**	**270**	**1500**	**1200**	**2600**
Benzo(b)fluoranthene (HMW)	ug/kg	59800	NCE	NCE		< 330	**2300**	**460**	**7700**	**540**	**350**	**1500**	**1300**	**2800**
Benzo(g,h,i)perylene (HMW)	ug/kg	119000	NCE	NCE		< 330	**1500**	**350**	**3300**	**420**	**230**	**1200**	**970**	**1800**
Benzo(k)fluoranthene (HMW)	ug/kg	148000	NCE	NCE		< 330	**910**	< 330	**2800**	< 330	**150**	**780**	**510**	**1300**
Chrysene (HMW)	ug/kg	4730	NCE	NCE		< 330	**1800**	< 330	**5800**	< 330	**260**	**1200**	**1000**	**2300**
Dibenzo(a,h)anthracene (HMW)	ug/kg	18400	NCE	NCE		< 330	**440**	< 330	**980**	< 330	< 100	**99**	< 190	**140**
Fluoranthene (HMW)	ug/kg	122000	NCE	NCE		< 330	**2400**	**430**	**13000**	**500**	**430**	**1900**	**1400**	**3400**
Fluorene (LMW)	ug/kg	122000	NCE	NCE		< 330	< 330	< 330	**520**	< 330	< 100	< 110	< 190	**94**
Indeno(1,2,3-c,d)pyrene (HMW)	ug/kg	109000	NCE	NCE		< 330	**1400**	**420**	**3700**	**550**	**180**	**860**	**700**	**1400**
Naphthalene (LMW)	ug/kg	99.4	NCE	NCE		< 330	< 330	< 330	< 330	< 330	< 100	< 110	< 190	< 90
Phenanthrene (LMW)	ug/kg	45700	NCE	NCE		< 330	**560**	< 330	**4700**	< 330	**170**	**590**	**430**	**1100**
Pyrene (HMW)	ug/kg	78500	NCE	NCE		< 330	**2300**	**390**	**11000**	**420**	**370**	**2000**	**1300**	**3600**
Total Low Molecular Weight PNAs (Using Detection Limit)	ug/kg	NCE	NCE	17219		**2310**	**2730**	**2310**	**9210**	**2310**	**770**	**1400**	**1570**	**2674**
Total High Molecular Weight PNAs (Using Detection Limit)	ug/kg	NCE	NCE	136730		**3320**	**17250**	**3960**	**61180**	**4590**	**2600**	**12339**	**9550**	**21640**
Total Low Molecular Weight PNAs (Dection Limit = 0)	ug/kg	NCE	29000	NCE		0	**1080**	0	**8220**	0	**170**	**960**	**430**	**2404**
Total High Molecular Weight PNAs (Detection Limit = 0)	ug/kg	NCE	1100	NCE		**350**	**17250**	**2970**	**61180**	**3600**	**2500**	**12339**	**9360**	**21640**
VOC														
1,1,1,2-Tetrachloroethane	ug/kg	225000	NCE	NCE		---	---	---	---	---	< 180	< 240	< 770	< 140
1,1,1-Trichloroethane	ug/kg	29800	NCE	NCE		---	---	---	---	---	< 180	< 240	< 770	< 140
1,1,2,2-Tetrachloroethane	ug/kg	127	NCE	NCE		---	---	---	---	---	< 180	< 240	< 770	< 140
1,1,2-Trichloroethane	ug/kg	28600	NCE	NCE		---	---	---	---	---	< 180	< 240	< 770	< 140
1,1-Dichloroethane	ug/kg	20100	NCE	NCE		---	---	---	---	---	< 180	< 240	< 770	< 140
1,1-Dichloroethylene	ug/kg	8280	NCE	NCE		---	---	---	---	---	< 180	< 240	< 770	< 140
1,2,3-Trichlorobenzene	ug/kg	NCE	NCE	NCE		---	---	---	---	---	< 250	< 250	< 770	< 250

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	Terrestrial Ecological Screening Level	Terrestrial Soil Screening Level	Terrestrial Background Concentration	6/20/2014 9:45 AM	6/18/2014 10:40 AM	6/19/2014 11:00 AM	6/18/2014 3:50 PM	6/20/2014 10:50 AM	3/5/2012 4:05 PM	3/5/2012 4:35 PM	3/5/2012 4:55 PM	3/6/2012 2:10 PM
	Location				SBKR0000I 501	SBKR0000I 502	SBKR0000I 503	SBKR0000I 504	SBKR0000I 505	SBKR0000L 201	SBKR0000L 202	SBKR0000L 203	SBKR0000L 204
	Sample				SBKR0000I 501S 062014S005	SBKR0000I 502S 061814S008	SBKR0000I 503S 061914S006	SBKR0000I 504S 061814S008	SBKR0000I 505S 062014S008	SBKR0000L 201S 030512S007	SBKR0000L 202S 030512S006	SBKR0000L 203S 030512S006	SBKR0000L 204S 030612S006
	Depth				0 - 0.5 ft	0 - 0.8 ft	0 - 0.6 ft	0 - 0.8 ft	0 - 0.8 ft	0 - 0.7 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.6 ft
	USCS Code				OL	OL	OL	OL	OL	OL	OL	OL	OL
	Saturation Status				Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Unsaturated
Analyte	Units				Result	Result	Result	Result	Result	Result	Result	Result	Result
1,2,3-Trichloropropane	ug/kg	3360	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,2,3-Trimethylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
1,2,4-Trichlorobenzene	ug/kg	11100	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
1,2,4-Trimethylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,2-Dichlorobenzene	ug/kg	2960	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,2-Dichloroethane	ug/kg	21200	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,2-Dichloropropane	ug/kg	32700	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,3,5-Trimethylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,3-Dichlorobenzene	ug/kg	37700	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,3-Dichloropropene, cis	ug/kg	398	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,3-Dichloropropene, trans	ug/kg	398	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,4-Dichloro-2-butene, trans	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
1,4-Dichlorobenzene	ug/kg	546	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
2-Butanone (MEK)	ug/kg	89600	NCE	NCE	---	---	---	---	---	< 750	< 810	< 2600	< 750
2-Hexanone	ug/kg	12600	NCE	NCE	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500
2-Methylnaphthalene	ug/kg	3240	NCE	NCE	---	---	---	---	---	< 610	< 810	< 2600	< 480
4-Methyl-2-pentanone (MIBK)	ug/kg	443000	NCE	NCE	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500
Acetone	ug/kg	2500	NCE	NCE	---	---	---	---	---	< 1500	< 2000	< 6400	< 1200
Acrylonitrile	ug/kg	23.9	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Benzene	ug/kg	255	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Bromobenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Bromochloromethane	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Bromodichloromethane	ug/kg	540	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Bromoform	ug/kg	15900	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Bromomethane	ug/kg	235	NCE	NCE	---	---	---	---	---	< 200	< 240	< 770	< 200
Carbon disulfide	ug/kg	94.1	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
Carbon tetrachloride	ug/kg	2980	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Chlorobenzene	ug/kg	13100	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Chloroethane	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 610	< 810	< 2600	< 480
Chloroform	ug/kg	1190	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Chloromethane	ug/kg	10400	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
cis-1,2-Dichloroethylene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Cyclohexane	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 500	< 500	< 770	< 500
Dibromochloromethane	ug/kg	2050	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Dibromochloropropane	ug/kg	35.2	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	Terrestrial Ecological Screening Level	Terrestrial Soil Screening Level	Terrestrial Background Concentration	6/20/2014 9:45 AM	6/18/2014 10:40 AM	6/19/2014 11:00 AM	6/18/2014 3:50 PM	6/20/2014 10:50 AM	3/5/2012 4:05 PM	3/5/2012 4:35 PM	3/5/2012 4:55 PM	3/6/2012 2:10 PM
	Location				SBKR0000I 501	SBKR0000I 502	SBKR0000I 503	SBKR0000I 504	SBKR0000I 505	SBKR0000L 201	SBKR0000L 202	SBKR0000L 203	SBKR0000L 204
	Sample				SBKR0000I 501S 062014S005	SBKR0000I 502S 061814S008	SBKR0000I 503S 061914S006	SBKR0000I 504S 061814S008	SBKR0000I 505S 062014S008	SBKR0000L 201S 030512S007	SBKR0000L 202S 030512S006	SBKR0000L 203S 030512S006	SBKR0000L 204S 030612S006
	Depth				0 - 0.5 ft	0 - 0.8 ft	0 - 0.6 ft	0 - 0.8 ft	0 - 0.8 ft	0 - 0.7 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.6 ft
	USCS Code				OL	OL	OL	OL	OL	OL	OL	OL	OL
	Saturation Status				Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Unsaturated
Analyte	Units				Result	Result	Result	Result	Result	Result	Result	Result	Result
Dibromomethane	ug/kg	65000	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
Dichlorodifluoromethane	ug/kg	39500	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
Diethyl ether	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 200	< 240	< 770	< 200
Di-isopropyl ether (DIPE)	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
Ethylbenzene	ug/kg	5160	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Ethylene dibromide	ug/kg	1230	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Ethyl-tert-butyl ether (ETBE)	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
Hexachloroethane	ug/kg	596	NCE	NCE	---	---	---	---	---	< 300	< 300	< 770	< 300
Isopropyl benzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
m&p-Xylene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 360	< 490	< 1500	< 290
Methyl Iodide	ug/kg	1230	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Methylene chloride	ug/kg	4050	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Methyl-tert-butyl ether (MTBE)	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
Naphthalene	ug/kg	99.4	NCE	NCE	---	---	---	---	---	< 610	< 810	< 2600	< 480
n-Butylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
n-Propylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
o-Xylene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
p-Isopropyl toluene (p-Cymene)	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
sec-Butylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Styrene	ug/kg	4690	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
t-Amyl methyl ether (TAME)	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 250	< 250	< 770	< 250
t-Butyl alcohol	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 2500	< 2500	< 2600	< 2500
t-Butylbenzene	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Tetrachloroethylene	ug/kg	9920	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Tetrahydrofuran	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 1000	< 1000	< 2600	< 1000
Toluene	ug/kg	5450	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Total BTEX	ug/kg	NCE	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
trans-1,2-Dichloroethylene	ug/kg	784	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Trichloroethylene	ug/kg	12400	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Trichlorofluoromethane	ug/kg	16400	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Vinyl chloride	ug/kg	646	NCE	NCE	---	---	---	---	---	< 180	< 240	< 770	< 140
Xylenes	ug/kg	10000	NCE	NCE	---	---	---	---	---	< 360	< 490	< 1500	< 290

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 3:00 PM	3/6/2012 11:45 AM	6/25/2014 9:55 AM	6/26/2014 10:55 AM	6/26/2014 2:00 PM	6/27/2014 9:55 AM	6/30/2014 2:25 PM	7/1/2014 10:30 AM	7/1/2014 1:30 PM	3/5/2012 2:15 PM	3/5/2012 2:50 PM	3/5/2012 3:25 PM	3/6/2012 9:35 AM
	Location	SBKR0000L 205	SBKR0000L 206	SBKR0000L 501	SBKR0000L 502	SBKR0000L 503	SBKR0000L 504	SBKR0000L 505	SBKR0000L 506	SBKR0000L 507	SBKR0000R 201	SBKR0000R 202	SBKR0000R 203	SBKR0000R 204
	Sample	SBKR0000L 205S 030612S007	SBKR0000L 206S 030612S005	SBKR0000L 501S 062514S006	SBKR0000L 502S 062614S006	SBKR0000L 503S 062614S009	SBKR0000L 504S 062714S008	SBKR0000L 505S 063014S010	SBKR0000L 506S 070114S006	SBKR0000L 507S 070114S006	SBKR0000R 201S 030512S010	SBKR0000R 202S 030512S008	SBKR0000R 203S 030512S009	SBKR0000R 204S 030612S007
	Depth	0 - 0.7 ft	0 - 0.5 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.9 ft	0 - 0.8 ft	0 - 1 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 1 ft	0 - 0.8 ft	0 - 0.9 ft	0 - 0.7 ft
	USCS Code	OL	OL	OL	OL	OL	ML	ML	ML	ML	OL	OL	OL	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals														
Beryllium	mg/kg	**0.54**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Molybdenum	mg/kg	**1.4**	< 1.0	**4.3**	< 1.0	**1.3**	< 1.0	< 1.0	**2.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	mg/kg	**16**	**19**	**15**	**9.3**	**16**	**14**	**12**	**22**	**9.7**	**13**	**8.5**	**20**	**15**
Vanadium	mg/kg	**16**	**15**	**18**	**14**	**21**	**11**	**7.4**	**10**	**9.1**	**15**	**16**	**20**	**8.4**
PNA														
2-Methylnaphthalene (LMW)	ug/kg	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**140**	< 150	< 94
Acenaphthene (LMW)	ug/kg	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	< 75	**250**	< 94
Acenaphthylene (LMW)	ug/kg	< 140	**170**	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**88**	**1300**	< 94
Anthracene (LMW)	ug/kg	< 140	**230**	< 330	< 330	< 330	**640**	**1100**	< 330	< 330	< 820	< 75	**1700**	< 94
Benzo(a)anthracene (HMW)	ug/kg	**440**	**1400**	**580**	< 330	**400**	**1700**	**3600**	< 330	< 330	< 820	**370**	**9400**	**230**
Benzo(a)pyrene (HMW)	ug/kg	**580**	**1700**	**640**	< 330	**470**	**1500**	**4200**	**370**	< 330	< 820	**360**	**12000**	**270**
Benzo(b)fluoranthene (HMW)	ug/kg	**670**	**2000**	**740**	< 330	**510**	**1600**	**4100**	**370**	< 330	< 820	**520**	**13000**	**370**
Benzo(g,h,i)perylene (HMW)	ug/kg	**460**	**1200**	**410**	< 330	< 330	**620**	**2400**	< 330	< 330	< 820	**220**	**7300**	**240**
Benzo(k)fluoranthene (HMW)	ug/kg	**300**	**690**	< 330	< 330	< 330	**710**	**2200**	< 330	< 330	< 820	**240**	**4200**	**190**
Chrysene (HMW)	ug/kg	**460**	**1400**	**450**	< 330	< 330	**1300**	**2700**	< 330	< 330	< 820	**500**	**9600**	**290**
Dibenzo(a,h)anthracene (HMW)	ug/kg	< 140	**100**	< 330	< 330	< 330	< 330	**980**	< 330	< 330	< 820	< 75	**590**	< 94
Fluoranthene (HMW)	ug/kg	**660**	**2300**	**1100**	**330**	**880**	**3200**	**5700**	**540**	< 330	< 820	**1200**	**14000**	**470**
Fluorene (LMW)	ug/kg	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**130**	**350**	< 94
Indeno(1,2,3-c,d)pyrene (HMW)	ug/kg	**320**	**880**	**550**	< 330	**370**	**930**	**3300**	< 330	< 330	< 820	**210**	**5500**	**190**
Naphthalene (LMW)	ug/kg	< 140	< 97	< 330	< 330	< 330	< 330	< 780	< 330	< 330	< 820	**160**	**250**	< 94
Phenanthrene (LMW)	ug/kg	**200**	**690**	**470**	< 330	**440**	**1100**	**1200**	< 330	< 330	< 820	**1500**	**4300**	**170**
Pyrene (HMW)	ug/kg	**730**	**2300**	**710**	< 330	**600**	**2200**	**4100**	**420**	< 330	< 820	**860**	**14000**	**410**
Total Low Molecular Weight PNAs (Using Detection Limit)	ug/kg	**1040**	**1478**	**2450**	**2310**	**2420**	**3390**	**6200**	**2310**	**2310**	**5740**	**2168**	**8300**	**734**
Total High Molecular Weight PNAs (Using Detection Limit)	ug/kg	**4760**	**13970**	**5840**	**3300**	**4550**	**14090**	**33280**	**3680**	**3300**	**8200**	**4555**	**89590**	**2754**
Total Low Molecular Weight PNAs (Dection Limit = 0)	ug/kg	**200**	**1090**	**470**	0	**440**	**1740**	**2300**	0	0	0	**2018**	**8150**	**170**
Total High Molecular Weight PNAs (Detection Limit = 0)	ug/kg	**4620**	**13970**	**5180**	**330**	**3230**	**13760**	**33280**	**1700**	0	0	**4480**	**89590**	**2660**
VOC														
1,1,1,2-Tetrachloroethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
1,1,1-Trichloroethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,1,2,2-Tetrachloroethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,1,2-Trichloroethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,1-Dichloroethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,1-Dichloroethylene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,2,3-Trichlorobenzene	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 3:00 PM	3/6/2012 11:45 AM	6/25/2014 9:55 AM	6/26/2014 10:55 AM	6/26/2014 2:00 PM	6/27/2014 9:55 AM	6/30/2014 2:25 PM	7/1/2014 10:30 AM	7/1/2014 1:30 PM	3/5/2012 2:15 PM	3/5/2012 2:50 PM	3/5/2012 3:25 PM	3/6/2012 9:35 AM
	Location	SBKR0000L 205	SBKR0000L 206	SBKR0000L 501	SBKR0000L 502	SBKR0000L 503	SBKR0000L 504	SBKR0000L 505	SBKR0000L 506	SBKR0000L 507	SBKR0000R 201	SBKR0000R 202	SBKR0000R 203	SBKR0000R 204
	Sample	SBKR0000L 205S 030612S007	SBKR0000L 206S 030612S005	SBKR0000L 501S 062514S006	SBKR0000L 502S 062614S006	SBKR0000L 503S 062614S009	SBKR0000L 504S 062714S008	SBKR0000L 505S 063014S010	SBKR0000L 506S 070114S006	SBKR0000L 507S 070114S006	SBKR0000R 201S 030512S010	SBKR0000R 202S 030512S008	SBKR0000R 203S 030512S009	SBKR0000R 204S 030612S007
	Depth	0 - 0.7 ft	0 - 0.5 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.9 ft	0 - 0.8 ft	0 - 1 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 1 ft	0 - 0.8 ft	0 - 0.9 ft	0 - 0.7 ft
	USCS Code	OL	OL	OL	OL	OL	ML	ML	ML	ML	OL	OL	OL	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
1,2,3-Trichloropropane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
1,2,3-Trimethylbenzene	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
1,2,4-Trichlorobenzene	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
1,2,4-Trimethylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
1,2-Dichlorobenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
1,2-Dichloroethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,2-Dichloropropane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,3,5-Trimethylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
1,3-Dichlorobenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
1,3-Dichloropropene, cis	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,3-Dichloropropene, trans	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,4-Dichloro-2-butene, trans	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
1,4-Dichlorobenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
2-Butanone (MEK)	ug/kg	< 1600	< 750	---	---	---	---	---	---	---	< 750	< 750	< 1600	< 750
2-Hexanone	ug/kg	< 2500	< 2500	---	---	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500
2-Methylnaphthalene	ug/kg	< 1600	< 580	---	---	---	---	---	---	---	< 410	< 330	< 1600	< 650
4-Methyl-2-pentanone (MIBK)	ug/kg	< 2500	< 2500	---	---	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500
Acetone	ug/kg	< 4100	< 1400	---	---	---	---	---	---	---	< 1000	< 1000	< 4100	< 1600
Acrylonitrile	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Benzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Bromobenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Bromochloromethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Bromodichloromethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Bromoform	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Bromomethane	ug/kg	< 490	< 200	---	---	---	---	---	---	---	< 200	< 200	< 490	< 200
Carbon disulfide	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
Carbon tetrachloride	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Chlorobenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Chloroethane	ug/kg	< 1600	< 580	---	---	---	---	---	---	---	< 410	< 320	< 1600	< 650
Chloroform	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Chloromethane	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
cis-1,2-Dichloroethylene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Cyclohexane	ug/kg	< 500	< 500	---	---	---	---	---	---	---	< 500	< 500	< 500	< 500
Dibromochloromethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Dibromochloropropane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 3:00 PM	3/6/2012 11:45 AM	6/25/2014 9:55 AM	6/26/2014 10:55 AM	6/26/2014 2:00 PM	6/27/2014 9:55 AM	6/30/2014 2:25 PM	7/1/2014 10:30 AM	7/1/2014 1:30 PM	3/5/2012 2:15 PM	3/5/2012 2:50 PM	3/5/2012 3:25 PM	3/6/2012 9:35 AM
	Location	SBKR0000L 205	SBKR0000L 206	SBKR0000L 501	SBKR0000L 502	SBKR0000L 503	SBKR0000L 504	SBKR0000L 505	SBKR0000L 506	SBKR0000L 507	SBKR0000R 201	SBKR0000R 202	SBKR0000R 203	SBKR0000R 204
	Sample	SBKR0000L 205S 030612S007	SBKR0000L 206S 030612S005	SBKR0000L 501S 062514S006	SBKR0000L 502S 062614S006	SBKR0000L 503S 062614S009	SBKR0000L 504S 062714S008	SBKR0000L 505S 063014S010	SBKR0000L 506S 070114S006	SBKR0000L 507S 070114S006	SBKR0000R 201S 030512S010	SBKR0000R 202S 030512S008	SBKR0000R 203S 030512S009	SBKR0000R 204S 030612S007
	Depth	0 - 0.7 ft	0 - 0.5 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 0.9 ft	0 - 0.8 ft	0 - 1 ft	0 - 0.6 ft	0 - 0.6 ft	0 - 1 ft	0 - 0.8 ft	0 - 0.9 ft	0 - 0.7 ft
	USCS Code	OL	OL	OL	OL	OL	ML	ML	ML	ML	OL	OL	OL	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Dibromomethane	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
Dichlorodifluoromethane	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
Diethyl ether	ug/kg	< 490	< 200	---	---	---	---	---	---	---	< 200	< 200	< 490	< 200
Di-isopropyl ether (DIPE)	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
Ethylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Ethylene dibromide	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Ethyl-tert-butyl ether (ETBE)	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
Hexachloroethane	ug/kg	< 490	< 300	---	---	---	---	---	---	---	< 300	< 300	< 490	< 300
Isopropyl benzene	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
m&p-Xylene	ug/kg	< 980	< 350	---	---	---	---	---	---	---	< 240	< 190	< 980	< 390
Methyl Iodide	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Methylene chloride	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Methyl-tert-butyl ether (MTBE)	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
Naphthalene	ug/kg	< 1600	< 580	---	---	---	---	---	---	---	< 410	< 330	< 1600	< 650
n-Butylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
n-Propylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
o-Xylene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
p-Isopropyl toluene (p-Cymene)	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
sec-Butylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Styrene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
t-Amyl methyl ether (TAME)	ug/kg	< 490	< 250	---	---	---	---	---	---	---	< 250	< 250	< 490	< 250
t-Butyl alcohol	ug/kg	< 2500	< 2500	---	---	---	---	---	---	---	< 2500	< 2500	< 2500	< 2500
t-Butylbenzene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Tetrachloroethylene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Tetrahydrofuran	ug/kg	< 1600	< 1000	---	---	---	---	---	---	---	< 1000	< 1000	< 1600	< 1000
Toluene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Total BTEX	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
trans-1,2-Dichloroethylene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Trichloroethylene	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Trichlorofluoromethane	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 100	< 490	< 200
Vinyl chloride	ug/kg	< 490	< 170	---	---	---	---	---	---	---	< 120	< 96	< 490	< 200
Xylenes	ug/kg	< 980	< 350	---	---	---	---	---	---	---	< 240	< 190	< 980	< 390

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

Analyte	Units	Date \ Time Collected	3/6/2012 3:45 PM	3/6/2012 11:15 AM	6/18/2014 12:00 PM	6/18/2014 2:35 PM	6/19/2014 9:25 AM	6/20/2014 11:55 AM	6/24/2014 1:50 PM	6/24/2014 11:35 AM	6/24/2014 11:33 AM	6/24/2014 11:30 AM	6/25/2014 11:15 AM	6/24/2014 3:30 PM
		Location	SBKR0000R 205	SBKR0000R 206	SBKR0000R 501	SBKR0000R 502	SBKR0000R 503	SBKR0000R 505	SBKR0000R 506	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507R1	SBKR0000R 508
		Sample	SBKR0000R 205S 030612S005	SBKR0000R 206S 030612S007	SBKR0000R 501S 061814S005	SBKR0000R 502S 061814S007	SBKR0000R 503S 061914S005	SBKR0000R 505S 062014S007	SBKR0000R 506S 062414S005	SBKR0000R 507S 062414S033	SBKR0000R 507S 062414S022	SBKR0000R 507S 062414S007	SBKR0000R 507R1S 062514S035	SBKR0000R 508S 062414S006
		Depth	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	3 - 3.3 ft	2 - 2.2 ft	0 - 0.7 ft	2.2 - 3.5 ft	0 - 0.6 ft
		USCS Code	OL	OL	OL	OL	OL	OL	SP-SM	ML/SP	ML	OL	ML	OL
		Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Saturated	Unsaturated	Saturated	Unsaturated
Metals														
Beryllium	mg/kg		< 0.50	**0.56**	< 0.61	**0.73**	< 0.53	**0.64**	< 0.50	< 0.50	< 0.50	< 0.60	< 0.56	< 0.50
Molybdenum	mg/kg		< 1.0	**2.2**	< 1.2	< 1.3	< 1.1	**3.1**	< 1.0	< 1.0	**1.4**	< 1.2	**2.7**	< 1.0
Nickel	mg/kg		**12**	**27**	**18**	**20**	**14**	**11**	**19**	**5.7**	**14**	**25**	**14**	**11**
Vanadium	mg/kg		**19**	**20**	**19**	**28**	**15**	**24**	**16**	**7.8**	**13**	**14**	**15**	**10**
PNA														
2-Methylnaphthalene (LMW)	ug/kg		< 95	< 130	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330
Acenaphthene (LMW)	ug/kg		< 95	< 130	< 330	< 330	< 330	< 330	< 330	**970**	**3300**	< 330	**630**	< 330
Acenaphthylene (LMW)	ug/kg		< 95	**130**	**440**	**450**	< 330	< 330	< 330	**2000**	**1400**	< 330	**1800**	< 330
Anthracene (LMW)	ug/kg		< 95	**120**	**490**	**420**	< 330	< 330	**740**	**7000**	**2900**	< 330	**1900**	< 330
Benzo(a)anthracene (HMW)	ug/kg		< 95	**940**	**2400**	**2600**	**730**	< 330	**2600**	**19000**	**9600**	**610**	**12000**	**1000**
Benzo(a)pyrene (HMW)	ug/kg		< 95	**1200**	**2800**	**3100**	**1000**	< 330	**2200**	**17000**	**8000**	**950**	**9500**	**840**
Benzo(b)fluoranthene (HMW)	ug/kg		< 95	**1200**	**3100**	**3400**	**860**	< 330	**3100**	**19000**	**8800**	**1200**	**9700**	**1500**
Benzo(g,h,i)perylene (HMW)	ug/kg		< 95	**940**	**1500**	**1700**	**610**	< 330	**1300**	**8200**	**4300**	**660**	**4900**	**780**
Benzo(k)fluoranthene (HMW)	ug/kg		< 95	**560**	**1000**	**1300**	**390**	< 330	**1100**	**5900**	**3300**	**420**	**3500**	**560**
Chrysene (HMW)	ug/kg		< 95	**940**	**2300**	**2400**	**570**	< 330	**2400**	**16000**	**8200**	**640**	**10000**	**1000**
Dibenzo(a,h)anthracene (HMW)	ug/kg		< 95	< 130	**610**	**670**	< 330	< 330	< 330	**2500**	**610**	< 330	**1700**	< 330
Fluoranthene (HMW)	ug/kg		**91**	**1200**	**3600**	**3500**	**900**	< 330	**5500**	**43000**	**22000**	**1200**	**19000**	**2400**
Fluorene (LMW)	ug/kg		< 95	< 130	< 330	< 330	< 330	< 330	< 330	**2100**	**2300**	< 330	**910**	< 330
Indeno(1,2,3-c,d)pyrene (HMW)	ug/kg		< 95	**660**	**1700**	**1900**	**770**	< 330	**1600**	**9500**	**4700**	**1100**	**5000**	**1100**
Naphthalene (LMW)	ug/kg		< 95	< 130	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330
Phenanthrene (LMW)	ug/kg		< 95	**410**	**980**	**890**	< 330	< 330	**1900**	**11000**	**6100**	**330**	**1700**	**770**
Pyrene (HMW)	ug/kg		**140**	**1500**	**3500**	**3600**	**820**	< 330	**4400**	**34000**	**22000**	**1100**	**26000**	**2100**
Total Low Molecular Weight PNAs (Using Detection Limit)	ug/kg		**665**	**1180**	**3230**	**3080**	**2310**	**2310**	**4290**	**23730**	**16660**	**2310**	**7600**	**2750**
Total High Molecular Weight PNAs (Using Detection Limit)	ug/kg		**991**	**9270**	**22510**	**24170**	**6980**	**3300**	**24530**	**174100**	**91510**	**8210**	**101300**	**11610**
Total Low Molecular Weight PNAs (Dection Limit = 0)	ug/kg		0	**660**	**1910**	**1760**	0	0	**2640**	**23070**	**16000**	**330**	**6940**	**770**
Total High Molecular Weight PNAs (Detection Limit = 0)	ug/kg		**231**	**9140**	**22510**	**24170**	**6650**	0	**24200**	**174100**	**91510**	**7880**	**101300**	**11280**
VOC														
1,1,1,2-Tetrachloroethane	ug/kg		< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	ug/kg		< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,1,2,2-Tetrachloroethane	ug/kg		< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	ug/kg		< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	ug/kg		< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,1-Dichloroethylene	ug/kg		< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,2,3-Trichlorobenzene	ug/kg		< 250	< 360	---	---	---	---	---	---	---	---	---	---

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 3:45 PM	3/6/2012 11:15 AM	6/18/2014 12:00 PM	6/18/2014 2:35 PM	6/19/2014 9:25 AM	6/20/2014 11:55 AM	6/24/2014 1:50 PM	6/24/2014 11:35 AM	6/24/2014 11:33 AM	6/24/2014 11:30 AM	6/25/2014 11:15 AM	6/24/2014 3:30 PM
	Location	SBKR0000R 205	SBKR0000R 206	SBKR0000R 501	SBKR0000R 502	SBKR0000R 503	SBKR0000R 505	SBKR0000R 506	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507R1	SBKR0000R 508
	Sample	SBKR0000R 205S 030612S005	SBKR0000R 206S 030612S007	SBKR0000R 501S 061814S005	SBKR0000R 502S 061814S007	SBKR0000R 503S 061914S005	SBKR0000R 505S 062014S007	SBKR0000R 506S 062414S005	SBKR0000R 507S 062414S033	SBKR0000R 507S 062414S022	SBKR0000R 507S 062414S007	SBKR0000R 507R1S 062514S035	SBKR0000R 508S 062414S006
	Depth	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	3 - 3.3 ft	2 - 2.2 ft	0 - 0.7 ft	2.2 - 3.5 ft	0 - 0.6 ft
	USCS Code	OL	OL	OL	OL	OL	OL	SP-SM	ML/SP	ML	OL	ML	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Saturated	Unsaturated	Saturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
1,2,3-Trichloropropane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,2,3-Trimethylbenzene	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
1,2,4-Trichlorobenzene	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,2-Dichloroethane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,2-Dichloropropane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,3-Dichloropropene, cis	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,3-Dichloropropene, trans	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,4-Dichloro-2-butene, trans	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
2-Butanone (MEK)	ug/kg	< 750	< 1200	---	---	---	---	---	---	---	---	---	---
2-Hexanone	ug/kg	< 2500	< 2500	---	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	ug/kg	< 650	< 1200	---	---	---	---	---	---	---	---	---	---
4-Methyl-2-pentanone (MIBK)	ug/kg	< 2500	< 2500	---	---	---	---	---	---	---	---	---	---
Acetone	ug/kg	< 1600	< 3000	---	---	---	---	---	---	---	---	---	---
Acrylonitrile	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Benzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Bromobenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Bromochloromethane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Bromodichloromethane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Bromoform	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Bromomethane	ug/kg	< 200	< 360	---	---	---	---	---	---	---	---	---	---
Carbon disulfide	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
Carbon tetrachloride	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Chlorobenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Chloroethane	ug/kg	< 650	< 1200	---	---	---	---	---	---	---	---	---	---
Chloroform	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Chloromethane	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethylene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Cyclohexane	ug/kg	< 500	< 500	---	---	---	---	---	---	---	---	---	---
Dibromochloromethane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Dibromochloropropane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---

Table 2. Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

	Date \ Time Collected	3/6/2012 3:45 PM	3/6/2012 11:15 AM	6/18/2014 12:00 PM	6/18/2014 2:35 PM	6/19/2014 9:25 AM	6/20/2014 11:55 AM	6/24/2014 1:50 PM	6/24/2014 11:35 AM	6/24/2014 11:33 AM	6/24/2014 11:30 AM	6/25/2014 11:15 AM	6/24/2014 3:30 PM
	Location	SBKR0000R 205	SBKR0000R 206	SBKR0000R 501	SBKR0000R 502	SBKR0000R 503	SBKR0000R 505	SBKR0000R 506	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507	SBKR0000R 507R1	SBKR0000R 508
	Sample	SBKR0000R 205S 030612S005	SBKR0000R 206S 030612S007	SBKR0000R 501S 061814S005	SBKR0000R 502S 061814S007	SBKR0000R 503S 061914S005	SBKR0000R 505S 062014S007	SBKR0000R 506S 062414S005	SBKR0000R 507S 062414S033	SBKR0000R 507S 062414S022	SBKR0000R 507S 062414S007	SBKR0000R 507R1S 062514S035	SBKR0000R 508S 062414S006
	Depth	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	3 - 3.3 ft	2 - 2.2 ft	0 - 0.7 ft	2.2 - 3.5 ft	0 - 0.6 ft
	USCS Code	OL	OL	OL	OL	OL	OL	SP-SM	ML/SP	ML	OL	ML	OL
	Saturation Status	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Unsaturated	Saturated	Saturated	Unsaturated	Saturated	Unsaturated
Analyte	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Dibromomethane	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
Dichlorodifluoromethane	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
Diethyl ether	ug/kg	< 200	< 360	---	---	---	---	---	---	---	---	---	---
Di-isopropyl ether (DIPE)	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Ethylene dibromide	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Ethyl-tert-butyl ether (ETBE)	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
Hexachloroethane	ug/kg	< 300	< 360	---	---	---	---	---	---	---	---	---	---
Isopropyl benzene	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
m&p-Xylene	ug/kg	< 390	< 720	---	---	---	---	---	---	---	---	---	---
Methyl Iodide	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Methylene chloride	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Methyl-tert-butyl ether (MTBE)	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
Naphthalene	ug/kg	< 650	< 1200	---	---	---	---	---	---	---	---	---	---
n-Butylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
n-Propylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
o-Xylene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
p-Isopropyl toluene (p-Cymene)	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
sec-Butylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Styrene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
t-Amyl methyl ether (TAME)	ug/kg	< 250	< 360	---	---	---	---	---	---	---	---	---	---
t-Butyl alcohol	ug/kg	< 2500	< 2500	---	---	---	---	---	---	---	---	---	---
t-Butylbenzene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Tetrachloroethylene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Tetrahydrofuran	ug/kg	< 1000	< 1200	---	---	---	---	---	---	---	---	---	---
Toluene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Total BTEX	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
trans-1,2-Dichloroethylene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Trichloroethylene	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Trichlorofluoromethane	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Vinyl chloride	ug/kg	< 190	< 360	---	---	---	---	---	---	---	---	---	---
Xylenes	ug/kg	< 390	< 720	---	---	---	---	---	---	---	---	---	---

Table 2. Footnotes - Kalamazoo River Background Soil Terrestrial Ecological Comparison
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release
Enbridge Energy, Limited Partnership

Soil Footnotes:
Terrestrial Background Concentration is explained in Section 2.3.3.2 in the NFA Report for Segment 2.
Bold values are concentrations detected above the reporting limit.
Shaded values exceed applicable Terrestrial Screening Levels.
Shaded values indicate that the laboratory Reporting Limit value exceeds applicable Terrestrial Screening Levels.
(A) = Avian.
(M) = Mammalian.
(P) = Plant.
--- = not completed/not analyzed.
ft = feet.
HMW = high molecular weight polynuclear aromatic hydrocarbon.
LMW = low molecular weight polynuclear aromatic hydrocarbon.
mg/kg = milligrams per kilogram.
NCE = no criteria established.
PNA = polynuclear aromatic hydrocarbon.
ug/kg = micrograms per kilogram.
USCS = Unified Soil Classification System.
VOC = volatile organic compound.

Unified Soil Classification System (USCS) Code Footnotes:
ML = Silt or silt with sand or silt with gravel or sandy silt or sandy silt with gravel or gravelly silt or gravelly silt with sand.
ML/SP = Sample collected over interval containing both ML and SP soil types.
OL = Organic silts or organic silty clays of low plasticity.
SP-SM = Poorly graded sand or poorly graded sand with gravel (SP) to silty sand or silty sand with gravel (SM).